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BY ARNOLD JAMES COOLEY,

PRACTICAL CHEMIST.

ILLUSTRATED WITH NUMEROUS ENGRAVINGS.

NEW YORK:

D. APPLETON & COMPANY, 200 BROADWAY.

1854.

PUBLISHERS' PREFACE.

The "Cyclopædia of Practical Receipts" being now completed, it is proper to offer to the reader a few preliminary remarks, concerning the nature and contents of the work to which his attention is directed. From the Author's Preface to the second edition of his Cyclopædia, recently issued in London,—from which this volume has been reprinted,—we extract the ensuing paragraphs, comprising nearly the whole of his original Preface.

"The design of this work is to present an accurate and compendious collection of formulæ and processes, with a variety of information suitable to the general reader, and practical purposes.

"In the performance of the laborious task of compilation, the principal aim has been, to render this work as extensively useful as possible, as well as a correct, comprehensive, and conveniently arranged manual of reference on the subjects on which it treats. It will be found to contain directions for the preparation of several thousand articles of interest and utility, together with their properties, uses, and doses, and the means of ascertaining their purity, and detecting their presence in other compounds. In most cases, the derivations of the names, and a short historical notice of the more important substances have been appended; and the various scientific and technical terms that occur have been generally defined, for the purpose of rendering the work as self-explanatory as possible. As the names of substances, especially those employed in chemistry, pharmacy, and medicine, have undergone repeated alterations, and even at the present day frequently vary as applied by different individuals, the old and new names, and the usual synonymes, English, Latin and Continental, have been introduced, for the purpose of preventing mistakes, and facilitating reference to more elaborate works. A general, rather than a scientific arrangement has been adopted, because the object of the work is popular and universal; and though useful to men of science, it is more especially addressed to practical persons and the public at large. Theoretical reasonings have been avoided, except in some instances, where a slight knowledge of scientific principles seemed necessary to the proper application of practical detail. The whole book will form a compendious Dictionary of Reference for the manufacturer, tradesman, and amateur, as well as the heads of families; and there are few persons who will not find, on looking over its pages, some article that will interest them.

"The sources from which the materials of the present work have been derived, render it deserving of the utmost confidence. The best and latest authorities have been invariably resorted to, and innumerable volumes, both British and Continental, have been consulted and compared. A large portion of the work has been derived from the personal experience of the Editor, and the processes of various laboratories

and manufactories, many of which he can highly recommend, from having inspected their application on an extensive scale. The indiscriminate adoption of matter WITHOUT EXAMINATION, has been uniformly avoided; and in no instance has any process been admitted, unless it rested upon some well-known fact of science, or came recommended on good authority. In the majority of cases, the sources of information have been indicated, for the purpose of enabling the reader to form a proper estimation of their value. Wherever this is not the case, in reference to borrowed formulæ or facts, the omission has arisen from the impossibility of accurately determining to whom the merit is due. The individual names that appear in the work, are those of the persons to whom the immediately attached information or formulæ are usually attributed, or on whose recommendation or authority they have been taken.

"It has been endeavored to avoid confusion of the medicinal weights and measures, with those commonly used in trade and commerce. For this purpose, it was deemed advisable to employ the usual signs or characters to indicate those denominations of either, that do not correspond in value. The quantities would have been gladly brought to one uniform standard, had such an attempt been practicable. The method adopted in this particular, will be found both simple and accurate.

"The nature of a condensed alphabetical arrangement not permitting numerous individual articles to come under distinct heads, the casual reader may often be led to suppose this work most deficient, where in reality it is most copious. Thus, on searching for Hydrocyanic Acid under H, or Picric Acid under P, such an article will not be found; but on reference to the heads Prussic Acid, and Carbazotic Acid, other names for those articles, much valuable matter on those subjects will be met with. In like manner, a vast number of pharmaceutical preparations, as Pills, Lotions, Ointments, &c., will be found mentioned in the remarks that follow the notice of their principal ingredients. Many extensive subjects are also necessarily dispersed under several distinct heads. Thus, information on the manufacture of LIQUEURS will be found under the heads, Cordials, Crêmes, Balms, Oils, Anisette de Bordeaux, Sighs of Love, Parfait Amour, Noyeau, Ratafia, &c.; on PERFUMERY, under the heads, Eaux, Esprits, Essences, Extracts, Pommades, Poudres, &c.; on DYEING, under the heads, Calico-printing, Dyeing, Archil, Annotto; Blue, Brown, Black, and other Dyes; Alumina, Tin, Mordants, Chloride of Tin, Brazil-wood, and Indigo. By a little attention, such divisions may be referred to, and readily compared. Sufficient directions are appended to the various processes, to enable even those who are unacquainted with chemical manipulations, to apply them with success."

The work has been reprinted exactly from the last London edition, with one exception, which must be stated. After the volume was begun, it was discovered that there was a large number of references to articles which are not comprised in the miscellany. It appears that the compilation was entered upon without any distinct survey of the multifarious materials appertaining to such a Cyclopædia; and therefore, constant directions were superadded to the same or analogous substances or preparations, which it was designed should be embodied in subsequent portions of the alphabetic classification. Early, however, in the progress of the volume, it must have been ascertained that, by following out that unrestricted introduction of subjects, the Cyclopædia would have been a book, "de omnibus rebus, et quibusdam

aliis;" and whether it could have been completed to the word FINIS, during the life-time of the Author, is very problematical. Those supernumerary explanations, consequently, were omitted. Hence it became necessary to subject the book to a close examination, that all those fictitious references might be excluded, and the reader thus be saved the trouble of turning over the volume for expected information, which the work does not contain in the form specified, but which is really included in the primary articles. Among the continual variety of those irrelevant references, it is possible that a few of them may have been unwittingly overlooked; otherwise, they have been erased; and thus the reader has been saved indefinite perplexity, in not obtaining, as might be supposed, the requisite intelligence upon the subject which he was investigating.

The Publishers, therefore, now present to the mistresses and managers of domestic economy, and to the various classes of experimental artisans, and men of business, both operatives and traders, a volume which is universally admitted to be very superior to every preceding collection of receipts, for general utility. The whole series is the result of actual scientific tests, and presented in a very lucid manner; combining the utmost economy and utility, with elegance and easiness of attaining the object desired.

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NEW YORK, *November* 19, 1845.

ABBREVIATIONS AND SIGNS

USED IN THIS WORK.

Alc. Alchemical.
Am. H. American Hospital.
Ant. Antidote.
Arab. Arabic.
Aust. Ph. Austrian Pharmacopœia.
Bat. Ph. Batavian do.
Co. Compound.
Comp. Do.
Comp. Composition.
Dan. Danish.
Dan. Ph. Danish Pharmacopœia.
Def. Definition.
Der. Derivation.
Dim. Diminutive.
Dut. Dutch.
E. H. Royal Edinburgh Hospital.
Eq. Equivalent.
Equiv. Do.
Estim. Estimation.
Exter. Extermination.
Fr. French.
F. H. French Hospital.
Fr. H. Do.
For. H. Foreign Hospital.
Ger. H. German do.
Ger. German.
Guy's H. Guy's Hospital.
Hist. History.
Hos. F. Hospital Formulary.
Ing. Ingredients.
It. Ital. Italian.
Ital. H. Italian Hospital.
Linn. Linnæus.
M. Mix.
Maj. Majendie's Formulary.
No. Number.
O. Old Pharmacopœia.
Obs. Obsolete.
P.C. Pharmacopœia Chirurgica.
P. Cod. Paris Codex, or French Pharmacopœia.
P. D. Dublin Pharmacopœia
P. E. Edinburgh do.
P. L. London do.
P. U. S. United States do.
p. æ. Equal parts.
Pf. Proof.
Port. Portuguese.
pp. Prepared.
Prep. Preparation.
Pres. Preservation.
Proc. Process.
Prod. Product.
Prop. Properties.
Prus. Ph. Prussian Pharmacopœ'a.
Pur. Purity.
Purif. Purification.
q. p. As much as you please.
q. s. As much as sufficient.
℞. Recipe, take
Rest. Restoration.
Rus. Ph. Russian Pharmacopœia.
S. A. According to art.
Sour. Sources.
Sp. Span. Spanish.
Span. Ph. Spanish Pharmacopœia.
sp. Spirit.
ss. One-half.
St. B. H. St. Bartholomew's Hospital.
St. Geo. H. Saint George's do.
S. V. Spirit of wine.
S. V. R. Rectified spirit of wine.
Swed. Swedish.
Swed. Ph. Swedish Pharmacopœia.
Syn. Synonymes.
U. C. H. University College Hospital.

C. An imperial gallon.
Cong. Do.
gall. Do.
qt. An imperial quart.
O. An imperial pint.
pt. Do.
cwt. A hundred-weight of 112 lbs. avoirdupois.
qr. A quarter of a hundred-weight, of 28 lbs. avoirdupois.
lb. When preceded by Arabic figures, a pound, *Avoirdupois*, of 7000 grains.
lb. When followed by Roman numerals, a pound, *Troy*, of 5600 grains.
℥ A Troy ounce, of 480 grains.
f℥ A fluid ounce, or 1-20th of an imperial pint.
oz. An avoirdupois ounce, of 437½ grains.
dr. A drachm, or the 1-8th of an ounce.
ʒ A Troy drachm.
dwt. A pennyweight, or 24 grs.
fʒ A fluid drachm, or the 1-8th of a fluid ounce.
℈ A scruple, or 20 grains.
♏ A minim, or drop, of 60 to the fluid drachm.
Drop Wherever this word occurs, a minim is intended.
gr. grs. A grain, or grains Troy.

CYCLOPÆDIA

OF

PRACTICAL RECEIPTS.

ABERNETHY MEDICINES. These originally consisted of a three-grain mercurial pill, administered over-night, followed by an aromatized black draught in the morning. Finding, however, that when frequently taken they produced salivation, which proved injurious to their sale, the proprietor lessened the quantity of blue pill, and added a proportionate weight of compound extract of colocynth. Two grains of the former, and three grains of the latter, are the quantities generally adopted for an adult, followed by about an ounce of the draught, as above mentioned. When this is not agreeable, a dose of castor oil, or any mild purgative medicine that the patient may fancy, will prove equally efficacious.

ABIETIC ACID. M. Baup has given this name to an acid principle which he found in the resin of the pinus abies. Caillot has applied the same name to a resinous acid which he discovered in Strasburg turpentine and common frankincense. Berzelius regards it as a mixture of the resins alpha and beta of the above turpentine.

Prep. Digest the resin of the pinus abies, first in weak and afterwards in strong alcohol, mix the two liquors, filter and evaporate; dissolve the residuum in strong alcohol, filter and again evaporate. It may be further purified by resolution, forming a salt of copper by adding a solution of verdigris, and afterwards decomposing it, by the addition of hydrochloric acid.

Remarks. In its purest state it crystallizes in square plates, dissolves in alcohol, and forms salts with the alkalis. It is probably a mixture of the pinic and sylvic acids.

ABIETINA. *Syn.* ABIETIN, ABIETINE. A crystallizable resin found in Strasburg turpentine. (Caillot.) Berzelius says it is the resin gamma of the same turpentine. (Jour. de Pharm. xvi. 436.)

ABORTION. The expulsion of the human fœtus, after the sixth week, and before the sixth month of pregnancy. In its most extended sense, the term has been applied synonymously with miscarriage. The latter term, however, has been generally restricted to the first six weeks after conception. The expulsion of the fœtus after the sixth but before the ninth month, is termed premature labor.

Causes. Nervous irritability, plethora, advanced age, scurvy, syphilitic, scrofulous, or mercurial taints, malformation of spine or pelvis, luxurious and indolent habits of living, excessive indulgence of the passions, extreme terror, anger, joy, &c.; falls, blows, violent exercise, vomiting, coughing, and rough purgatives; hot baths, stimulating liquors, and other excitants generally.

Treat. I. *Prevention.* Avoid all the above-mentioned exciting causes, and immediately on the appearance of any suspicious symptoms seek a recumbent posture, and repose in every shape practicable. A dose of castor oil, confection of senna, or other mild aperient should be taken, and should there be much hæmorrhage, injections of cold water, or cold infusion of black tea, must be had recourse to. A cold hipbath, or sponging the lower part of the body with water and vinegar, often proves successful. Should the symptoms continue unabated, medical assistance should be sought.

II. *Recovery.* Should the preceding measures prove ineffectual, and no violent symptoms supervene, the remaining treatment may consist in continuing the recumbent posture, keeping the bowels regular, taking a light nutritious diet, and avoiding exposure to draughts of cold air. This treatment may be gradually abandoned by the patient for her usual course of life, in proportion as she feels herself able to do so. In many cases, however, the only treatment required throughout, is simply the adoption for a few days of the recumbent posture, gentle laxatives, and a light nutritious diet. Various formulæ for medicines suitable to the above will be found in the body of this work.

ABRACADABRA. A word supposed by the Cabalists, and by other weak-minded and superstitious persons, to possess great virtue in preventing and curing fevers, especially intermittents, (ague,) of which the kind called semi-tertian was

believed to be most easily removed by its incantation. The formula has been preserved by Serenus Samonicus, and its application as an amulet may be seen described in Defoe's 'History of the Plague in London.' A paper with the Abracadabra written on it, and worn round the neck, was thought to propitiate a Syrian deity of that name. The words Abrabax, Abrasax, Abraxas, and abracadabra, are doubtless closely connected together in their origin and import, but tracing them back into the confusion and superstition of the past, would occupy more space than can be devoted to the subject here, and be of too theoretical and speculative a character for a practical work.

Formula from Serenus Samonicus.

ABRACADABRA.
ABRACADABR
ABRACADAB
ABRACADA
ABRACAD
ABRACA
ABRAC
ABRA
ABR
AB
A

ABRASION. A superficial injury of the skin, resulting from the partial removal of the cuticle by friction.

Treat. When the injured surface is small, and unexposed, no application is generally required, but when the reverse is the case, it is proper to protect the unsound part from dirt and further injury, by applying a piece of lint or soft linen rag, covered with spermaceti or some other simple unguent; a piece of strapping, or bandage of any sort, may then be placed over it, to keep it on. In most cases, however, a simple piece of strapping, or sticking-plaster, will be found quite sufficient.

ABSCESS. A tumor or swelling in the membranous or fleshy parts of the body, resulting from inflammatory action, and the consequent formation of purulent matter.

Symp. I. *Acute Abscess.* Active inflammation rapidly terminating in the production of pus or matter and the increase of the tumor. The latter may be felt fluctuating within the part, if near the surface; an uneasy sensation of weight follows, the swelling assumes a conical shape, and what is popularly known as a head or point; the skin reddens, and gradually becomes thinne , until at last it breaks, and the imprisoned matter escapes. In favorable cases, healthy action follows, the injury is repaired, and the wound heals. In some cases instead of the tumor bursting, the whole of the matter is absorbed into the blood, and the swelling disappears, whence sometimes disagreeable consequences have resulted, but as frequently without any perceptible derangement of the general health.

II. *Chronic Abscess.* This generally occurs in scrofulous constitutions, and is usually confined to the lymphatic glands and cellular tissue. The symptoms up to the period of the discharge of the matter are of a similar kind to those just described, but with a much less degree of inflammation. At this point, however, the latter increases, fever is excited, and the discharge continues, producing debility and sometimes fatal results. In favorable cases, the healing and reparative processes are similar to those of the *acute* variety, but much more tedious, the *curative* action often *barely keeping pace* with the *injurious effects* of the ulcer, even in its improving condition.

Treat. Cooling applications, friction, and continued gentle pressure may be tried in the early stages, and, if ineffectual, suppuration should then be promoted by warm poultices and fomentations, accompanied by a liberal diet until the rupture of the tumor; when this takes place, the ulcer must be regularly dressed twice a day with simple ointment, and kept perfectly clean; a light nutritious diet should now be adopted, and the bowels kept gently open with mild aperients. When the abscess is situate in the head, chest, joints, near the eye, or other part where its presence may be productive of serious injury from pressure or diffusion, it should be opened with a lancet as soon as mature, but this operation had better be performed by a surgeon. Chronic abscesses require to be opened earlier than acute ones, but in other respects their treatment is similar.

ABSINTHIC ACID. A peculiar acid found by Braconnot in the artemisia absinthium, or common wormwood, where it exists in combination with potash.

Prep. Add a solution of acetate of lead to a watery infusion of common wormwood, wash the precipitate in cold distilled water, then suspend it in water contained in a tall vessel of glass, and pass sulphureted hydrogen gas through the liquor, until all the lead is precipitated; lastly, decant the clear liquid and evaporate.

Prop. Sour, uncrystallizable, deliquescent, solid, forming salts with the bases, called absinthates. These may be procured by double decomposition from a mixture of absinthate of ammonia, and a solution of the metallic oxides. Some of these salts are crystallizable.

Remarks. It has lately been asserted that this acid is similar to the succinic, if it be not actually the same.

ABSINTHINE. *Syn.* ABSINTHIN, ABSINTHINA, ABSINTHIA. The proximate bitter principle of the artemisia absinthium, or common wormwood, discovered by Caventou in the watery infusion of the tops and flowers, and called by him the "pure bitter principle."

Prep. Precipitate an infusion of wormwood with another of acetate of lead, pass sulphureted hydrogen gas through the filtered liquor, until the excess of lead is thrown down, then filter and evaporate to dryness; digest the residuum in a mixture of alcohol and ether, and abandon the solution to spontaneous evaporation. Collect the ramified brown product, redissolve it in alcohol, treat it with charcoal, filter and again evaporate, and repeat this operation until the absinthine is rendered quite white.

Prop., Uses, &c. When quite pure, white, semi-crystalline, and very soluble in alcohol. Its physiological effects, as far as known, are similar to the extract of wormwood. It flavors the milk and flesh of animals in the same way as the plant from which it is procured. It has been proposed

as a remedy for dyspepsia, and as a substitute for quinine in intermittents. *Dose.* Unascertained.

ABSORBENT, ALKALINE. *Prep.* Mix 4 oz. of lime water with 1 oz. each of liquor of potassa and sirup of orange peel. *Dose.* One tablespoonful in a cup of water or broth, in dyspepsia and heartburn.

ABSORBENT, AROMATIC VOLATILE. *Prep.* I. Carbonate of ammonia 2 dr., pure water 5 oz., sirup of orange peel 1 oz., mix, for a six-ounce mixture.

II. Sal volatile 1 oz., water 4 oz., orange sirup 1 oz., mix, and keep it in a well-corked bottle. *Dose.* As last.

Remarks. This preparation is much esteemed as a mild antacid by persons laboring under dyspepsia, heartburn, or acidity of the stomach, arising from excessive indulgence in spirituous or fermented liquors. It also possesses considerable stimulating properties, and will *partially* remove the fit of drunkenness.

ABSORBENTS (IN CHEMISTRY.) Substances that possess the property of withdrawing moisture from the atmosphere that surrounds them. Absorbents are distinguished from deliquescent salts. The latter attract moisture and dissolve therein, while the former merely absorb or suck it up into their pores, in the same way as a sponge does water.

Process of ascertaining the absorbent power of different substances. Thoroughly dry the article by the suitable application of heat, and transfer it, while still hot, into a clean dry vial furnished with a perfectly tight ground-glass stopper. When quite cold, place the substance in a prepared large wide-mouthed glass bottle, which must then be closed, and kept so for some time. A delicate hygrometer being then introduced, will indicate on its scale the degree of dryness of the enclosed air. The atmosphere in the large bottle should be rendered as damp as possible, by suspending moistened rag or filtering paper within it, previously to the introduction of the substance to be examined.

Remarks. Experiments of this nature are only relatively correct, and must be performed under *exactly* similar circumstances, to furnish even correct comparative results. In the examination of soils, for instance, not only must the heat employed be the same, but the duration of the drying, as well as the method of saturating the air in the large bottle, must also be the same; in fact, the whole process in each case must be as similar as careful manipulation can possibly make them.

ABSORBENTS (IN PHARMACY.) Substances that remove acidity in the stomach and bowels.

List. Magnesia and carbonate of magnesia, prepared chalk, and the carbonates and bicarbonates of soda, potassa, and ammonia, are the principal medicines of this class. The first three are called earthy, and the others alkaline absorbents.

Prop., &c. They neutralize acidity, and frequently possess the power of stopping diarrhœa, (especially chalk,) and relieving heartburn and dyspepsia, particularly when the latter depends on the presence of acidity in the primæ viæ. *Dose.* One teaspoonful of either of the powders (except the last) in a cup of water, forms an excellent antacid draught. The dose of ammonia is 10 to 15 grains.

Remarks. Prepared chalk is most suitable to diarrhœa; potash, soda, or magnesia, to heartburn and dyspepsia; and ammonia, when nervous or hysterical affections are present. The latter, besides being absorbent, is stimulant and diaphoretic, and, in large doses, emetic.

ABSORPTION (IN AGRICULTURE.) The power possessed by soils of absorbing moisture.

Remarks. The more a soil is divided by labor and vegetation, the greater is its absorbent power. and consequently its fertility. The latter chiefly depends on its capacity for imbibing moisture, and may be illustrated by reference to recent and disintegrated lava. (Leslie.) The finely divided state, most penetrable by the delicate fibres of plants, appears to derive its superior power of acting on atmospheric vapor from the augmentation of its surface and the multiplication of its points of contact. (Ure.) This method of increasing the fertility of a soil is well known to scientific farmers, and seldom neglected by them. (Loudon.) The method of ascertaining the absorbent power of soils, is described under ABSORBENT IN CHEMISTRY, to which the reader is referred. That soil must be regarded as the most fertile, which possesses this power in the greatest degree. Garden-mould has the highest absorbent power of any mineral substance. (Leslie.)

ACCIDENTS. *Syn.* CASUALTIES. The reader is referred to the separate articles DROWNING, FIRES, &c. &c., for the best means of either preventing or meeting accidents. The following remarks are, however, so valuable, that they deserve general attention, being equally applicable to every description of casualty and misfortune.

"There is no situation or condition in human life that is not liable to a great variety of serious accidents, against which it is not always possible to guard by the greatest care and foresight. It is of the utmost importance, therefore, to remember that in every accident, one of the greatest and most powerful assistants in remedying it, is *presence of mind.* For want of this desirable self-possession, many a person has lost his life, and the mischiefs arising from unforeseen accidents have become irretrievable. If the mind be overwhelmed by fear, or astounded by alarm, it is utterly impossible that deliberate measures can be taken to secure either our own safety or the safety of those who happen to be about us, and in the same predicament with ourselves. We repeat, therefore, that it is a proof of the truest wisdom to cultivate, and endeavor to preserve as much as possible, in all extraordinary and unexpected situations, either of body or mind, or both, that *chief requisite* in every accident, for acting with coolness, judgment, and effect—*presence of mind.*"

ACERIC ACID. *Syn.* MAPLE ACID. An acid discovered by Scherer in the milky sap of the acer campestre or common maple tree, where it exists in combination with lime.

Prep. Place the juice of the maple in a warm situation for about a fortnight, that it may ferment and lose its acidity; then filter and add a solution of acetate of lead to the clear liquor, separate the precipitate on a filter, and wash it with *very cold water.* Then pour a large quantity of boiling wa-

ter on the filter, and receive it in glass vessels. On cooling, brilliant crystals of acerate of lead will be deposited. After washing the latter with cold water, reduce them to fine powder and suspend it in hot water in a tall glass jar, then pass sulphureted hydrogen gas through the liquid, until all the lead is thrown down; filter, boil for a few minutes to expel the adhering sulphurous gas, then gently evaporate and crystallize.

Prop. These resemble the malic acid. With the bases it forms salts called acerates.

Remarks. From the recent researches of Gmelin and others, it appears probable that the aceric and malic acids are the same, and consequently their salts must be also similar.

ACETAL. *Syn.* OXYGEN ETHER. A fluid discovered by Dobeireiner, and by him called oxygen ether.

Prep. Pour alcohol, to the depth of one inch, into a tall wide-mouthed glass bottle, and suspend three or four watch-glasses or capsules containing platinum powder, to the depth of two lines, close to the surface of the spirit. Moisten the powder with water, and place the apparatus in a warm situation for some months. Acetal, aldehyde, and acetic acid and ether will be formed. The liquor must be then neutralized by adding chalk, and carefully distilled. The product treated with powdered chloride of calcium, until the latter is no longer moistened, decanted, and redistilled, yields pure acetal, as soon as the boiling point reaches 202° Fahr. (Liebig.)

Prop. Liquid, colorless, resembles alcohol, smells somewhat like the Hungary wines; boils at 204° F.; miscible with alcohol; decomposed by strong alkalis and acids. Probably a compound of aldehyde and oxide of ethule. (Liebig.)

ACETATE. *Syn.* ACETAS (*Lat.*); ACETATE (*Fr.*); ESSIGSAURE (*Germ.*) A salt formed by the union of the acetic acid with an alkali, earth, or metallic oxide.

Prop. The majority of the acetates are very soluble in water, and by destructive distillation either yield acetone and water, or acetone and acetic acid. The aqueous solutions of the alkaline acetates turn mouldy and are decomposed by keeping. Care should therefore be taken to dissolve no more at once than is wanted for immediate use.

Prep. Most of the acetates may be formed by direct solution of the hydrate or oxide of the base in the diluted acid, or by double decomposition.

Use. Some of the acetates are employed in medicine, and others are used extensively in the arts.

Tests. The acetates are characterized by the following properties, by which they may be easily detected:—1. The fumes of acetic acid evolved on the addition of sulphuric acid. 2. Striking a deep red when added to solutions of the sesqui-salts of iron. 3. The white lamellar and pearly precipitates they produce with the nitrates of mercury and silver. 4. The production of acetone by exposure to a dull red heat in close vessels.

ACETIC ACID. *Syn.* ACETOUS ACID. ACETYLIC ACID. GLACIAL ACETIC ACID. RADICAL VINEGAR. CONCENTRATED VINEGAR. PURE PYROLIGNEOUS ACID. ACIDUM ACETICUM, P. L. 1836. ACIDUM ACETICUM FORTIUS, P. L. 1824. ACIDUM ACETOSUM, P. L. 1788. ACID ACETIQUE (*Fr.*) ESSIGSAURE (*Ger.*) ACIDO ACETICO (*Ital.*) AZYNZUUR, (*Dut.*) The pure sour principle contained in vinegar, where it exists in a dilute state, and usually in combination with mucilage, sugar, coloring matter, and extractive.

Hist. Acetic acid, in the shape of vinegar, appears to have been known even to remote antiquity. It is mentioned by Moses, nearly 1500 years before the birth of Christ, (Numb. vi. 3,) and was extensively used by the Israelites, as well as by the Greeks and Romans. Hippocrates employed it medicinally, and, according to Livy, Hannibal the Carthaginian general is fabled to have softened the rocks of the Alps by fire and vinegar. Geber purified common vinegar by distillation, and Stahl, at the commencement of the eighteenth century, obtained concentrated acetic acid by decomposing the acetates by oil of vitriol. At the present day acetic acid or vinegar is employed either as an antiseptic, a condiment, or a medicine, in every portion of the civilized world.

Sources. It is found ready formed in several products of the vegetable kingdom, and is generated by the fermentation of saccharine fluids, and the destructive distillation of wood, and other vegetable matter. By the latter process it is procured in combination with empyreumatic matter. (See PYROLIGNEOUS ACID.) Vauquelin found the acetates of potash and lime in elm sap, and Morin detected acetate of ammonia in the juice of the areca catechu. Gmelin says acetic acid has been found in some mineral waters, and Geiger states the same respecting the acetate of potassa. The sambucus nigra, the rhus typhinus, and the phœnix dactalifera contain a large quantity of vinegar.

Var. The acetic acid of commerce is obtained from vinegar, of which there exist four varieties, usually named after the materials from which they are procured, viz.: 1, ***Malt Vinegar;*** 2, ***Wine Vinegar;*** 3, ***Sugar Vinegar;*** 4, ***Wood Vinegar.*** (See VINEGAR.) The first three are formed by the acetous fermentation, which converts the alcohol of the wine, beer, or fermented sugar into acetic acid, by the absorption of oxygen; the latter, by the destructive distillation of wood in iron retorts. By a proper process of purification, each of them may be made to yield an equally pure and concentrated acid. (See ACETIFICATION.)

Prep. In the present article I shall confine myself to the pure acetic acid of the chemist, reserving the consideration of vinegar and pyroligneous acid for separate articles.

There are three different processes employed for the manufacture of pure concentrated acetic acid, viz.: I. *The decomposition of a dry acetate by oil of vitriol;* II. *The decomposition of the acetate of copper or lead by dry distillation;* and, III. *The decomposition of the acetate of lead by sulphate of iron or soda, in the dry way.* I shall describe each, as well as some others less frequently adopted.

I. *By decomposing the acetates by sulphuric acid.*

a. By decomposing the acetate of soda.

1. (*Acidum aceticum, P. L.*) *Ing.* Acetate of soda lb. ij. sulphuric acid ℥ix. water f℥ix. *Proc.* Mix the acid with the water and pour it on the

acetate, previously put into a glass retort, then distil in a sand-bath, taking care not to augment the heat towards the end of the process.

Remarks. The proportions in this process are nearly equal to one equivalent of each of the ingredients, and the result is 51 parts of real acetic acid, and 114·5 parts of water, or 165·5 parts of acetic acid of 30·8% or sp. gr. 1·048 for every equivalent, or 137 parts of crystallized acetate of soda employed, being within 1½% of the estimated product. 100 gr. of this acid exactly saturate 87 gr. of crystallized carbonate of soda. 15 parts added to 85 parts of distilled water is equal in strength to the distilled vinegar of the London Pharmacopœia, or, under common circumstances, 1 part of acid to 7 parts of water is sufficiently accurate.

Prop. The acetic acid P. L. crystallizes at 28° F., and even at 45° if a crystal of acid be dropped into it; melts again under 60°; crystallizes beautifully under a pressure of 1100 atmospheres. (Phil. Trans. 1826.) Is not strong enough to dissolve camphor, resin, or essential oils, in any quantity.

2. (*Pure glacial acid. Liebig's Process.*) *Ing.* Three parts of acetate of soda, thoroughly dried and finely powdered; 9·7 parts of pure sulphuric acid. *Proc.* Pour the acid on the powder, previously put into a capacious retort. A sufficient heat will be developed by the reaction of the ingredients to cause ⅓ of the acetic acid to pass over without a fire; heat must be then applied, until the mass in the retort becomes quite liquid. Rectify the product, when two parts of pure acid will be obtained, containing only 20 per cent. of water. The latter portion which comes over, exposed in a close vessel to a temperature below 40° F., deposites crystals of hydrated acetic acid. The weaker, or liquid portion, being poured off, the crystals may be again melted and crystallized by cooling. The crystals of the last operation, separated from the liquid, are perfectly pure.

b. By decomposing the acetate of potassa by sulphuric acid.

1. (*Process of the Dub. Ph.*) *Ing.* 52 parts of sulphuric acid; 100 parts of acetate of potassa. *Proc.* Similar to that of the London College; carefully distil to dryness. *Prod.* 50 to 51 parts of liquid acid of 1·074. (P. D.)

2. *Ing.* 2 parts of fused and powdered acetate of potassa; 1 part of strongest oil of vitriol. *Proc.* Similar to the above. To remove a slight contamination of sulphurous acid, it may be redrawn, putting a little dried acetate of lead into the retort.

c. By decomposing acetate of lead by sulphuric acid.

1. (*Process of the Ed. Ph.*) *Ing.* Acetate of lead, fused, and in fine powder, ℥vj, pure strong sulphuric acid, f ʒixss. *Proc.* Heat the dried and powdered acetate of lead to 320°, in a porcelain basin, placed in a bath of oil or fusible metal, and continue stirring until the powder ceases to concrete; it must then be weighed, mixed with the acid, and distilled to dryness, at a heat of 320°. Agitate the product with 1 or 2 gr. of oxide of lead, decant the clear portion, and re-distil.

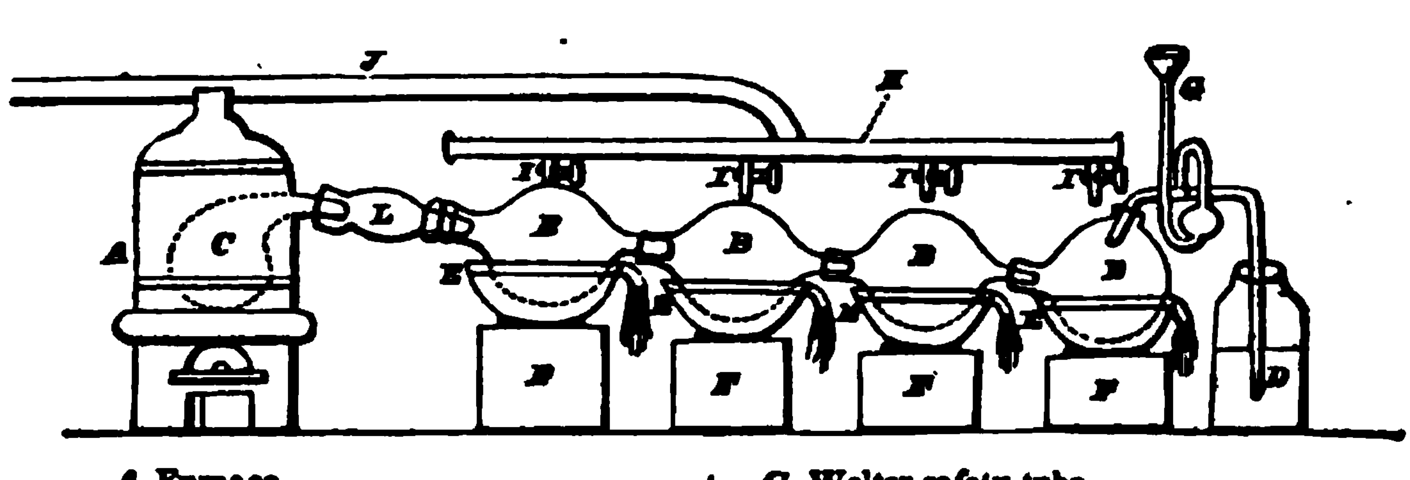
Prop. The sp. gr. of this acid is 1·065. (P. E.) containing, by Mohr's table, 98·5 p. c. of glacial acid.

2. *Ing.* 4 parts of thoroughly dried acetate of lead, in powder; 1 part of the strongest oil of vitriol. *Proc.* Distil to dryness.

Remarks. The above yields a very strong acid, nearly equal to that prepared by the Ed. formula. The quality and quantity of the product are improved if a little peroxide of manganese be put into the retort before distilling. (Baup.) Liebig recommends the proportions to be 3 parts of the acetate to 8 parts of the acid. Dollfuss's concentrated acetic acid was prepared by a similar process, by drawing over 7 oz. of acid from a mixture of 12 oz. of sugar of lead with 6 oz. of oil of vitriol.

II. *By submitting the acetate of copper or lead to dry distillation.* Acetic acid, thus prepared, has been called *spirit of verdigris; esprit de Venus; spiritus veneris, &c.*

a. (*From binacetate of copper, or distilled verdigris.*) *Proc.* Carefully dry the binacetate by a very gentle heat, then introduce it into a stoneware retort, the bottom of which has been previously coated with a mixture of fire clay and horsedung, to render it more capable of standing the heat. It must then be placed in a suitable furnace, and connected by an adopter tube, with 3 or 4 double tubulated globes, the last of which must be furnished with a vertical tubulature, to which a double Welter's safety tube should be connected, the other end being immersed in a basin half filled with distilled vinegar, while the funnel portion communicates with the atmosphere. Each globe is placed in a basin of water, which is kept cool by a stream continually passing through it; the upper portion is also covered with cloths, which are kept wetted with cold water. The distillation is not commenced until 15 or 20 hours after the apparatus is luted together, to allow the luting time to dry and harden. Fire must then be applied, and so regulated that the drops follow each



A, Furnace.
B B B B, Glass receivers.
C, Stoneware retort.
D, Bottle containing vinegar.
E E E E, Basins containing water.
F F F F, Supports for basins.
G, Welter safety-tube.
H, Supply-pipe of cold water.
I I I I, Cocks to supply water to the basins.
J, Water main.
L, Adopter connecting retort and globes.

ether with considerable rapidity from the end of the adopter tube at the same time that the bubbles of air succeed each other, in no inconvenient quantity, from the other end of the apparatus. Should the process proceed too rapidly, the fire should be damped. The operation is continued, and the fire gradually increased until vapor ceases to come over, which is known by the globes cooling, notwithstanding the greater heat of the furnace. The operation is now concluded, and the fire may be allowed to expire. When the whole has cooled, the acid must be collected and rectified in glass vessels before it is fit for sale. The rectifying apparatus may be similarly arranged to the above, with the exception of the whole being formed of glass. The operation must now be very carefully conducted and discontinued before barely the whole of the acid has distilled over, as the last portion is apt to injure the flavor and color. The foregoing diagram represents the form of the apparatus usually employed in this manufacture.

Remarks. This process is similar to that of P. L. of 1787. The acid obtained is nearly equal to half the weight of the verdigris employed. The strongest acid is found in the third receiver, and the weakest in the first, that of the second being intermediate between the two. It is always accompanied by a slight odor of fragrant pyroacetic spirit, for which reason it has generally received the preference for making aromatic vinegar and perfumery. I am informed by a friend that good binacetate of copper will yield by careful management full half its weight of an acid of the sp. gr. 1·050. It dissolves camphor, resins, and essential oils with facility. This is one of the oldest methods of procuring glacial acetic acid, and still continues to be preferred for many purposes.

Caution. The cupreous residuum of the distillation is pyrophoric, and frequently inflames as soon as it is exposed to the air. It consists of metallic copper in a state of minute division along with a little charcoal.

b. (*From acetate of lead.*) Instead of acetate of copper use dried acetate of lead, and proceed as in the last process, taking especial care to avoid overfiring, as the quantity obtained is thereby lessened, while the quality is also inferior.

III. *By acting on a mixture of an acetate and sulphate by heat.*

a. Ing. 2 parts of gently-calcined sulphate of iron; 5 parts of dried acetate of lead. *Proc.* Mix them together in fine powder, and cautiously distil into a large and well-cooled receiver.

Remarks. This is a good and economical process. Badollier's strong acetous acid was made in this way from 1 lb of green vitriol and 10 oz. of sugar of lead.

b. Ing. Sulphate of potassa 12 oz.; oil of vitriol 6 oz.; water 18 oz.; acetate of soda 9 oz. (dried;) oxide of manganese ½ oz. *Proc.* Dissolve the sulphate in the acid and water, evaporate to dryness, then mix it with the acetate of soda and manganese, and distil from a glass retort in a sand-bath. The product has been called Lowitz's acetic acid.

Other methods of making acetic acid, either not generally adopted, or but partially known.

I. *Elegant method of making pure acetic acid.* (From the German.) *Proc.* Take a long glass case and arrange shelves in it, a few inches apart, one above another, on which place small flat dishes of earthenware or wood; then fill these dishes with alcohol, and suspend over each a portion of the black powder of platina, (see Platinum;) hang strips of porous paper in the case, with their bottom edges immersed in the spirit to promote evaporation. Set the apparatus in a light place at a temperature of from 68° to 86° F., for which purpose the sunshine will be found convenient. In a short time the formation of vinegar will commence, and the condensed acid vapors will be seen trickling down the sides of the glass, and collecting at the bottom. We shall find that during this process, produced by the mutual action of the platina and the vapor of alcohol, there will be an increase of temperature, which will continue till all the oxygen contained in the air enclosed in the case is consumed, when the acetification will stop; the case must be then opened for a short time to admit of a fresh supply of air, when the operation will recommence.

Prod. A case of 12 cubic feet contents, with 7 or 8 oz. of platina powder, will produce 1⅛ lb. of absolute acetic acid from 1 lb. of absolute alcohol; and if we reckon the product at the commercial strength of vinegar, the increase will of course be very great. From 25 lb. of platina powder and 300 lb. of alcohol may be produced daily nearly 350 lb. of *pure acid.* It is proper to state that the platina powder does not *waste*, and that the most *inferior* spirit may be employed.

Remarks. The revenue laws of this country unfortunately forbid the adoption of this *beautiful* process, but there is no statute that prevents any individual employing it on the small scale for private consumption. In Germany, vinegar is manufactured on this plan, and from the price of crude alcohol, it must prove very profitable. In the United States of America, where alcohol may be purchased for less than a dollar a gallon, as well as in other parts where spirit is equally cheap, this process will no doubt ultimately prove to be the *cheapest source of pure acetic acid.*

II. *An excellent acetic acid* of considerable strength may be made by soaking perfectly dry charcoal in common vinegar, and then subjecting it to distillation. The water comes over first, and on increasing the heat, the acid follows. Vinegar-bottoms will answer for this purpose.

III. If vinegar or dilute acetic acid be exposed to the air in very cold weather, or to freezing mixtures, the water will separate in the form of ice, and the strong acetic acid may be obtained by draining it into suitable glass vessels, observing to do so at a temperature sufficiently low to keep the water solid.

IV. *An acetic acid sufficiently strong for all ordinary purposes* may be obtained without distillation, by pouring 60 parts of strong sulphuric acid, diluted with 5 parts of water, on 100 parts of well-dried acetate of lime, digesting with occasional agitation in a close vessel, decanting the clear liquid and straining the remainder.

General Commentary. The preceding pages present a brief synopsis of the manufacture of pure acetic acid. On the large scale it is principally manufactured from acetate of soda, which yields a sufficiently strong and pure acid for commercial purposes, without the trouble of rectification. In

this process, shallow copper vessels formed without rivets or solder in those parts exposed to the action of the acid, are employed for the purpose of the distillation. A coil of *drawn* copper pipe, heated by steam, having a pressure of 30 to 35 lbs. to the inch, traverses the bottom of the apparatus. The refrigeratory consists of well-cooled earthenware vessels, and the adopter or pipe connecting the still with the receivers, is also of the same materials. *Stills* of earthenware are also frequently employed, and even worms and condensers of silver are sometimes used. The principal supply of crude acetate of soda at the present time is obtained from America, Norway, and Sweden. This is purified by the chemist and sent to the distiller, who, after extracting the acetic acid, returns the resulting sulphate of soda to the chemist, who employs it in the decomposition of acetate of lime. This ingenious method of mutual assistance and application of chemical science offers some explanation of the low price at which this article may now be purchased. I have seen a very pure acetic acid of sp. gr. 1·050 lately bought in quantity at the *extraordinary low price* of 5½d. per pound. In preparing the acid on the small scale, glass retorts are usually directed to be used, but glass alembics are much more convenient and safe, as the product is less likely to be contaminated by the spirting of the ingredients, or the liquor boiling over the brim of the vessel. In preparing the pure acid, care should be taken that the acetate of soda does not contain common salt, as the carbonate of soda, prepared by calcination, and frequently used to form the acetate, is generally contaminated with it, and yields up its muriatic acid during the process of distillation, thus vitiating the product. The formula of the London College produces a beautiful acid of 1·048; that of the Dublin College another acid of 1·074; and that of the Edinburgh a still stronger acid; but the process of the latter is so unnecessarily minute and complicated, that it is never employed except for experiments. In all these methods the product becomes more concentrated in proportion to the dryness of the materials and the strength of the oil of vitriol used. The process of Liebig is unexceptionable, and yields a very strong and pure acid by the first distillation, which may be afterwards further concentrated if required, as is directed in that formula. Acid containing 20% of water, yields a good deal of its superfluous water to dry sulphate of soda, by standing over it. (Liebig.)

In all these processes the acetic acid exists ready formed in the acetate, and is set free by the superior affinity of the sulphuric acid for the base; and from its volatility, passes over into the receiver on the application of heat; when, being again cooled, it is condensed. In the distillation of verdigris, heat may be said to perform a similar part to that of the acid. (See ACETIFICATION and VINEGAR.)

Prop. Pure acetic acid (*glacial*) is liquid above 62°, but below that temperature forms brilliant, colorless, transparent scales and tabular crystals. In the liquid state its sp. gr. is 1·063. It possesses a powerful odor, and acid taste, dissolves camphor and resins, and mixes with alcohol, ether, essential oils, and water. In its pure state it is a corrosive and an acrid poison. It unites with the basis, forming salts called acetates. It should be kept in stoppered glass bottles.

Uses. In the arts. (Dilute under the form of vinegar.) As an antiseptic in pickling and preserving animal and vegetable food, and anatomical preparations; in dyeing and calico printing the manufacture of tinctures and other pharmaceutical preparations. *As a medicine.* A little added to water forms a useful febrile drink, employed also for scurvy, and as a palliative in phthisis. Added to clysters, it has been used in obstinate constipation; mixed with honey it forms a common gargle in ulcerated sore-throat; a few drops mixed with water make an excellent collyrium for chronic ophthalmia, and for removing lime-dust from the eye; in sprains and bruises it forms a useful fomentation. Strong acetic acid (P. L.) applied by means of a piece of rag tied to the end of a small stick, is a certain cure for ringworm or scaldhead—one or two applications generally effect a cure; as a caustic, it is used to remove warts and corns; a piece of lint or blotting-paper wetted with it and applied to the skin, and evaporation prevented by a piece of strapping, forms a common extemporaneous blister; it was once employed as a disinfectant, but is now only used as a fumigation, to remove the unpleasant smell of the sick room or crowded assemblies. *As a condiment*, it promotes the appetite and digestion, but its habitual use is said to produce emaciation. It also forms a popular refreshing scent in faintings, asphyxia, and nervous headache; and is also frequently used as a rubefacient, astringent, and local stimulant. The *strong acid* taken internally acts, however, as a violent poison, dissolving the animal tissues, and by destroying the organization, causing death. Orfila has recorded a fatal case arising even from its application to the surface of the body. *Dose, &c.* As a refrigerant, water soured with acetic acid or vinegar may be taken ad libitum. In enemas, 1 to 2 oz. of distilled vinegar is the proper quantity; for a lotion, 3 oz. of the latter to 5 or 6 oz. of water; and for a collyrium, 1 oz. of ditto to 1 pint of distilled water.

Purity. Acetic acid or vinegar is frequently adulterated with oil of vitriol, nitric or muriatic acid, as well as various other acrid substances, for the purpose of giving it a spurious acidity. It also frequently contains copper, which it derives from the vessels in which it has been kept or measured. The following table, which I have arranged for the purpose, exhibits an easy method of ascertaining its purity.

In addition to this, it may be remarked that sulphurous acid may be recognised by yielding a white precipitate on the addition of a small quantity of peroxide of lead, or by drawing the fumes into the lungs; acrid vegetable matter, as pepper, capsicum, horseradish, &c., by neutralizing the acid with an alkali, when it may be easily discovered by tasting.

Excise Law. Vinegar is allowed by law to contain $\frac{1}{1000}$ part by weight of sulphuric acid, it will therefore give a trifling precipitate with the tests mentioned in the table, but this will in no case exceed the 1·15 gr. (when dried and weighed) for a fluid ounce. The manufacture of acetic acid of any kind comes under the excise laws, and requires a license, which costs 100*l.* (Collyer.) The duty is at the rate of 2d. on every gallon of proof or No. 24 vinegar, until the strength reaches 35

o. p. or over proof, or equal to an acid of 40%, when it is charged in a different manner. (See ACETIMETRY.)

Tests. These are the same as for the acetates. *Estim.* (See ACETIMETRY.)

Behavior of Tests with Vinegar.

Names of Tests.	Acetic Acid quite pure.	Acetic Acid containing Oil of Vitriol.	Acetic Acid containing Nitric Acid.	Acetic Acid containing Muriatic Acid.	Acetic Acid containing Metals.
Solution of chloride of barium, nitrate of baryta, or chloride of calcium	...	White precipitate insoluble in nitric acid.			
Powdered chalk (short of saturation)	...	Ditto.			
Muriatic acid, added to the sample previously boiled with a little silver-leaf	...	...	White curdy precipitate, soluble in ammonia.		
Dilute solution of indigo (boiled)	...	...	Decolored.		
Gold-leaf wetted with muriatic acid, and digested with heat in a watch-glass	...	...	Partially dissolved.		
Gold-leaf moistened with nitric acid ...	...	...	...	Partially dissolved.	
Dilute solution of nitrate of silver... ...	...	Pearly-white precipitate.	...	Curdy-white precipitate, soluble in ammonia.	
Weak solution of iodide of potassium	...	...	...	...	Yellow precipitate, if lead be present.
Solution of acetate of lead	...	Whitish precipitate.	...	Turbidness.	
Sulphureted hydrogen gas or water	...	...	...	...	Black or dark-colored precipitate. (If this be dissolved in nitric acid, and ammonia added, it will give a blue color if copper be present.

ACETIFICATION. The oxidation of alcohol in the process of making vinegar. To be capable of acetification or conversion into vinegar it is necessary that the liquid should contain alcohol in some state or other, or some substance, as sugar, which, by the process of fermentation, is capable of producing it. The presence of a ferment or vegetable matter, and a temperature between 70° and 100° F., facilitates the operation. In the conversion of wines, beer, wort, &c. into vinegar, the sugar is first transformed by fermentation into alcohol, and in this state becomes oxidized or acidified by the absorption of atmospheric oxygen. Manufacturers should always remember that such is the true nature of this process. (See ACIDS, ACETIC ACID, and PYROLIGNEOUS, and VINEGAR.)

ACETIMETER. *Syn.* ACETOMETER. An instrument or apparatus for ascertaining the strength of acetic acid. (See the next article.)

ACETIMETRY. *Syn.* ACETOMETRY. The art or process of determining the strength of vinegar or acetic acid. Various methods have been proposed for this purpose, among which may be mentioned the following:

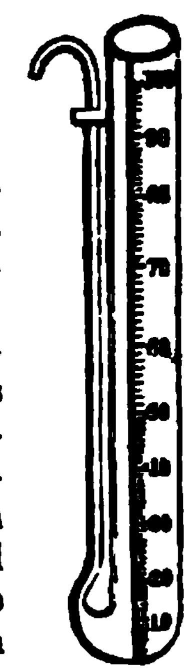
I. (*The plan adopted by the Excise.*) Hydrate of lime is added gradually to a sample of the vinegar, until it is *saturated*, and the sp. gr. of the resulting clear solution of acetate of lime is taken by the acetometer, invented by Messrs. J. and P Taylor. This instrument in construction resembles the common hydrometer, and stands at the mark on the stem called proof in a solution containing 5% of real acid, which is the strength of No. 24 vinegar, or an acid which will saturate exactly 14½ grains of crystallized carbonate of soda When the vinegar is stronger than proof, the instrument must be loaded with one or more of the small weights which are supplied with it, each of

which will indicate an additional 5§ up to 35§, which is the greatest strength at which the duty is levied by the gallon. To ascertain the per centage of real acid, 5§ must therefore be added to the number indicated by the acetometer. Thus: without being loaded, the instrument, on floating to a given mark, indicates a proof vinegar or one of 5§; with *one* weight, a vinegar of 10§; with *two* weights, 15§; with *three* weights, 20§, &c., &c. The reason of this is, that the starting point, or proof, is an acid of 5§. In the technical language of trade, each 5§ is called a vinegar. Thus: acid of 10§ is said to contain *two* vinegars; one of 15§, *three* vinegars, &c. A more common method is, however, to speak of the degrees of the acetometer as proof or overproof. Thus: No. 24 vinegar is said to be proof; one measuring 5 acetometer degrees—5 overproof or o. p.; one 10 degrees—10 o. p., &c. In malt and wine vinegars, which usually contain gluten or mucilage, this method is not strictly accurate, as these substances alter the specific gravity. A small weight marked M is supplied by Mr. Bate with the acetometers made by him, and is used in trying such vinegar.

Remarks. This plan, though sufficiently correct for commercial purposes, is liable to a small error, especially in vinegar containing much vegetable matter. If it be pure or very nearly so, the decimal fraction of the sp. gr. will be doubled by conversion into acetate of lime. Thus: 1·0085 in vinegar becomes 1·0170 when converted into a solution of acetate of lime. In malt vinegar, however, 0·005 may fairly be deducted from its sp. gr. as produced by the presence of mucilage and gluten. The quantity of foreign matter present in vinegar, may thus be approximatively ascertained, by deducting the decimal of the sp. gr. of the solution of acetate of lime, from double that of the decimal part of the sp. gr. of the vinegar. Thus: I find the sp. gr. of a sample of vinegar to be 1·014, and after saturating it with hydrate of lime, I again try it and find it to be 1·023, what is the sp. gr. of the *pure* vinegar, and what is due to foreign matter—

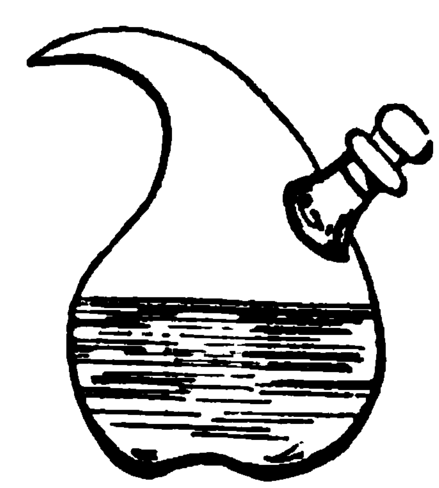
Decimal of sp. gr. of vinegar, doubled	·028
Decimal of sp. gr. of solution of acetate of lime	·023
Quantity of foreign matter equal to the difference	·005
Specific gravity of vinegar	1·014
Deduct sp. gr. due to foreign matter .	·005
Sp. gr. of a solution of acetic acid or pure vinegar of equal strength to sample	1.009

II. Dissolve 200 grains of pure crystallized bicarbonate of potash in a little water, and then add enough water to make it up to exactly 1000 parts by measure; as for instance, 1000 minims. A solution is thus formed, which, when added to a sample containing 100 measures of acetic acid or vinegar, until the latter be saturated, will indicate the exact amount of real acetic acid present. The test liquor should be made and measured in a long glass tube, capable of holding the whole 1000 measures, and graduated into 100 parts, every one of which will represent 1§ of dry acid. A convenient instrument for this purpose, is the *pouret* of Gay Lussac, which consists of a double tube of the shape of the following figure.



Remarks. Any other method of measuring or ascertaining the exact quantity of test liquor employed, may be used, as convenience or circumstances may suggest; but however this is done, it is necessary to do it in such a manner as to ensure the greatest accuracy.

III. Dissolve 200 grains of crystallized bicarbonate of potassa in 800 grains of distilled water, contained in a suitable shaped bottle, previously carefully weighed; when dissolved, weigh it again, and see that it is exactly equal to 1000 grs. This test liquor, like the last, is used to neutralize the acid in the sample for examination, but in this case the quantity must be 100 grs. instead of 100 measures. Every grain of the test liquor consumed will, therefore, indicate 1 tenth of a grain of real acetic acid, and every 10 grs. will be equal to 1§. A very convenient shaped bottle for this purpose is that known as Schuster's Alkalimeter, which consists of a very light stoppered glass bottle, having a neck drawn out to the one side, and furnished with a very fine orifice, which admits of the liquid being poured



out in small quantities with greater ease, and without the risk of an accident. The weight of the bottle and solution, after the process of neutralizing the acid of the sample, deducted from its previous weight, gives the exact weight of the test liquor consumed, and consequently the quantity of acetic acid that has been saturated by it.

Remarks. This method admits of great accuracy, and is preferable to the previous process, (No. II,) as it is much easier to weigh than to measure correctly, especially when the quantity is small.

IV. Instead of bicarbonate of potash, in Nos. II and III, either of the following salts may be used.

104 grs. dry carbonate of soda.
135 " " carbonate of potash.
283 " crystallized carbonate of soda.

Remarks. The dry carbonates of potassa and soda should be prepared by submitting the crystallized carbonate to a dull red heat in a crucible, when, after cooling, the proper quantity may be weighed.

V. By taking the specific gravity of the sample, (see Specific Gravity,) and seeking it in the following Tables, the per centage of acid may be ascertained sufficiently correct for most purposes.

TABLE I. The following Table is given by Messrs. TAYLOR, as the basis of their Acetometer.

Revenue Proof Acid, called by the manufacturer No. 24.

sp. gr.		
1·0085	contains real or anhydrous acid in 100,	5
1·0170	" "	10
1·0257	" "	15
1·0320	" "	20
1·0470	" "	30
1·0580	" "	40

TABLE II. The following Table, from the Pharm. Central Blatt für 1839, drawn up by M. MOHR, exhibits the sp. gr. of pure Acetic Acid of almost every strength.

Per cent. of Glacial Acid, (C. 4, H. 3, O. 3+Aq.)	Sp.Gr.	Per cent. of Glacial Acid, (C. 4, H. 3, O. 3+Aq.)	Sp.Gr.	Per cent. of Glacial Acid, (C. 4, H. 3, O. 3+Aq.)	Sp.Gr.
100	1·0635	66	1·069	32	1·0424
99	1·0635	65	1·068	31	1·041
98	1·067	64	1·068	30	1·040
97	1·0680	63	1·068	29	1·039
96	1·069	62	1·067	28	1·038
95	1·070	61	1·067	27	1·036
94	1·0706	60	1·067	26	1·035
93	1·0708	59	1·066	25	1·034
92	1·0716	58	1·066	24	1·033
91	1·0721	57	1·065	23	1·032
90	1·0730	56	1·064	22	1·031
89	1·0730	55	1·064	21	1·029
88	1·0730	54	1·063	20	1·027
87	1·0730	53	1·063	19	1·026
86	1·0730	52	1·062	18	1·025
85	1·0730	51	1·061	17	1·024
84	1·0730	50	1·060	16	1·023
83	1·0730	49	1·059	15	1·022
82	1·0730	48	1·058	14	1·020
81	1·0732	47	1·056	13	1·018
80	1·0735	46	1·055	12	1·017
79	1·0732	45	1·055	11	1·016
78	1·0732	44	1·054	10	1·015
77	1·073	43	1·053	9	1·013
76	1·072	42	1·052	8	1·012
75	1·072	41	1·0515	7	1·010
74	1·072	40	1·0513	6	1·008
73	1·071	39	1·050	5	1·0067
72	1·071	38	1·049	4	1·0065
71	1·071	37	1·048	3	1·004
70	1·070	36	1·047	2	1·002
69	1·070	35	1·046	1	1·001
68	1·070	34	1·045	0	1·0000
67	1·069	33	1·044		

Remarks. Table I is adapted to commercial vinegar, and is sufficiently accurate for all common purposes. Table II is intended for pure acetic acid. It will be seen that above a certain per centage, the specific gravity retrogrades; it is, therefore, better in trying very strong acid, to dilute it first with a given weight of distilled water, and to allow for it afterwards. The weight of glacial acetic acid, multiplied by ·8512, gives the weight of dry acid which it contains, and anhydrous acid, multiplied by 1·1748, will give a number representing an equivalent weight of glacial acid.

Caution. As a spurious acidity is frequently given to vinegar by adding other acids to it, which would thus give it a false appearance of strength, it is, therefore, better first to ascertain whether it be adulterated. (See ACETIC ACID.) The most correct, and, in many respects, the easiest method of acetimetry, is No. III or IV. The acetic acid of the L. P. has a sp. gr. of 1·048, and contains 30·8% of dry acid.* That of the Dublin College is 1·074, and that of the Edinburgh College 1·065.† (See SPECIFIC GRAVITY, and ACIDIMETRY.)

ACETULE. The hypothetical radical of the acetule series; neither itself nor oxide has been obtained alone. Its *hydrated oxide* is *aldehyde.* The *chloride of acetule* is formed by the lengthened exposure of chloride of ethule to the action of chlorine and light. The *oxychloride*, by saturating anhydrous ether with perfectly dry chlorine gas, exposing to external cold, and afterwards to a gentle heat. Both this and the preceding are transparent colorless fluids. *Suboxychloride of acetule* is a gas formed by heating the last article in contact with potassium. *Oxysulphuret of acetule* is made by passing sulphureted hydrogen gas through the oxychloride, until an oily liquid is formed, which, by exposure, becomes semi-crystalline. This is dissolved in hot alcohol, and is obtained in crystals on its cooling.

Remarks. For a knowledge of the preceding substances we are indebted to the researches of Malaguti and Regnault. The compounds of acetule offer beautiful examples of chemical substitution, but the nature of the presen work will not permit their being enlarged on here.

ACHROMATIC. Free from color, (from the Gr. ἀ, without, and χρωμα, color,) from which also is derived the word

ACHROMATISM. The destruction of the colored rings, which accompany the image of an object seen through a lens or prism.

Causes, &c. Light is not homogeneous, but decomposable into colored rays, either by refraction, absorption, or reflection. The colors of the prismatic spectrum are formed out of a ray of white light, by passing it through a glass prism, and a similar effect is produced if a lens or other refracting media be used instead. It has been observed, that when this production of color takes place, some of the colored portions of the spectra are more bent or refracted than others, and that the refracting or dispersive power varies with the nature of the refracting medium. A beam of light thrown on a simple converging lens, not only suffers refraction at the spherical surface, (called spherical aberration,) but the different colored rays, forming the beam of light, being unequally bent or refracted, diverge from their original course, and, consequently, fall separately instead of together, on the eye or object that receives them. Hence arise the colored rings or halos that surround objects viewed through ordinary glasses This effect is called chromatic aberration by opticians, and forms the greatest impediment to the construction of a *perfect* refracting telescope. It is the object of achromatism to remove this impediment. The subject, theoretically considered, is not less fraught with difficulty than with practical importance, and has engaged the attention of the first mathematicians and artists up to the present time.

* Dr. A. T. Thompson says (p. 819 of his Dispensatory, 10th ed.) "that it contains 30·7% real acid by weight;" yet, on the next page he says, "that of the L. C. contains 37% of real acid and 63% of water."

† In one place in the E. P. it is stated to be 1·065, and in another, 1·0685.

Correction. It has been endeavored to correct the chromatic aberration of lenses, by combining two or more made of different materials, possessing different dispersive powers. Thus the spectrum formed by flint glass, or glass containing lead, is longer than that formed by crown glass, for the same deviation; and when combined, the one tends to diminish the dispersion of the other. On this principle the achromatic object glasses of telescopes are generally formed in this country. A convex lens of crown glass is combined with a weaker concave lens of flint glass, the latter counteracting the dispersion of the former, without materially interfering with its refraction. A still better plan is, to place a concave lens of flint glass between two convex lenses of crown glass.

Remarks. All the larger object glasses lately manufactured are said to consist of only two lenses; the resulting achromatism proving sufficiently exact for all useful purposes. The principal achromatic glasses and telescopes recently made, have been manufactured by Dolland of London, and some of the opticians of Bavaria and Switzerland. The achromatism of prisms depends upon the same principles, and is determined and corrected in the same manner as lenses, but presents less difficulty on account of the spherical aberration of the latter. (See LENSES, TELESCOPE, MICROSCOPE.)

ACIDS. *In common language,* any substance possessing sourness or acidity; *in chemistry,* any electro-negative compound, capable of combining with bases to form salts. Most of the liquid acids possess a sour taste, and redden litmus paper.

Hist. The chemical theory of the acids is still undecided, and the laws which regulate their combinations with the bases, as well as the precise nature of the resulting salts, are involved in considerable obscurity. Lavoisier and the associated French chemists conceived that acidity resulted from the union of a peculiar combustible base, called a radical, with a common principle of acidification, called oxygen. The inaccuracy of this hasty generalization was disproved by Berthollet, who maintained that it was "carrying the limits of analogy too far to presume that all acidity arises from oxygen." The early opinion of Sir H. Davy, after revised and modified by Murray, was, that intimately combined water was the real "acidifying principle." In 1810, however, this celebrated chemist published a series of dissertations in the Philosophical Transactions, which fully overthrew the hypothesis of Lavoisier. It was soon established that both oxygen and hydrogen were capable of producing acids, of which the sulphuric and muriatic acids may be taken as examples. It is now generally acknowledged that no *one* substance or element can be regarded as the general "*acidifying principle.*" The more recent theory of the acids, elaborated out of the researches of Graham, Liebig, Dumas, Clark, Fremy, Thalow, Dulong, Peligot, and others, is affirmed by its supporters, to establish the views first suggested by Sir H. Davy, respecting the chloric and iodic acids and their salts. In this scheme, all the acids are united into one series, and all the salts into another, both being so closely connected, that it is said, "that these two series may be considered as one." The existence of hydrogen in the oxygen acids, in the free or active state, is here deemed an essential part of their constitution, and hence the name of hydracids has been given to them. This principle has been extended to *all* the acids, even the organic. Those acids that contain 1 eq. of hydrogen, are called monobasic; with 2 eq., bibasic; with 3 eq., tribasic, and so on; the general term polybasic, being applied to those which combine with two or more eq. of hydrogen. The muriatic may be taken as the type of the first; the tartaric that of the second; and the citric acid that of the third. This view of the acids presents the advantages of simplicity and unity of classification. In the union of the acids with the bases forming salts, it presumes that the hydrogen of the acid is replaced by the base, it having previously played the part of a base itself. Consequently acids may be viewed as the hydrogen salts of their radicals, and acids and salts, with regard to their constitution, form but one class. "The neutralizing power of an acid depends entirely on the number of eq. of hydrogen replaceable by the bases." (Liebig.) Other hypotheses have arisen respecting the acids, but have possessed little merit and obtained little notoriety.

Class. The acids have been variously classed by different writers, as into *organic* and *inorganic; metallic* and *non-metallic; oxygen acids, hydrogen acids, and acids destitute of either of these elements;* the names being applied according to the kingdom of nature, or class of bodies to which the radical belonged, or after the element which was presumed to be the acidifying principle.

Nomen. The names of the acids end either in *ic* or *ous;* the former being given to that containing the larger portion of the electro-negative element, or oxygen, and the latter to that containing the smaller quantity. As sulphuric acid, an acid of sulphur, containing 3 atoms of oxygen; sulphur*ous* acid, another sulphur acid, containing only 2 atoms of oxygen. When a base forms more than 2 acid compounds with oxygen, the Greek preposition *hypo* is added to that containing the smaller portion, as hyposulphuric and hyposulphurous acids. This system of nomenclature was originally adopted under the idea that *all* acids contained oxygen, but the same terms are now applied, regardless of the acidifying principle, as hydrochloric acid, hydrofluoric acid, &c. The prepositions *per, hyper,* and the syllable *oxy* are also prefixed to the names of acids, when it is intended to denote an *increase* of oxygen, as hypernitrous acid, perchloric acid, oxymuriatic acid, &c.

Cautions. All the strong liquid acids should be kept in glass bottles, furnished with perfectly tight ground-glass stoppers; glass vessels should be used in measuring them, and they should be dispensed in stoppered vials.

ACIDS, OXYGENIZED. These are compounds to which an apparent surcharge of oxygen is given by means of deutoxide of barium. They were first discovered by M. Thernard, and described by him in the Ann. de Chim. et Phys. viii. 306.

Proc. 1. Nitrate of baryta should first be obtained perfectly pure, and, above all, free from iron and manganese. The most certain means of procuring it is to dissolve the nitrate in water, to add to the solution a small excess of baryta water,

to filter and crystallize. 2. The pure nitrate is to be decomposed by heat. This ought not to be done in a common earthenware retort, because it contains too much of the oxides of iron and manganese, but in a perfectly white porcelain retort. Four or five pounds of nitrate of baryta may be decomposed at once, and the process will require about three hours. The baryta thus procured will contain a considerable quantity of silex and alumina; but it will have only very minute traces of manganese and iron, a circumstance of essential importance. 3. The baryta, divided by a knife into pieces as large as the end of the thumb, should then be placed in a luted tube of glass. This tube should be long and large enough to contain from 2¼ to 3½ lbs. It is to be surrounded with fire, and heated to dull redness, and then a current of dry oxygen gas is to be passed through it. However rapid the current, the gas is completely absorbed; so that when it passes by the small tube, which ought to terminate the larger one, it may be concluded that the operation is completed. It is, however, right to continue the current for seven or eight minutes more. Then the tube being nearly cold, the deutoxide, which is of a light gray color, is taken out and preserved in stoppered bottles. When this is moistened it falls to powder, without much increase of temperature. If in this state it be mixed with seven or eight times its weight of water, and a dilute acid be poured in, it dissolves gradually by agitation, without the evolution of any gas. The solution is neutral, or has no action on turnsole or turmeric. When we add to this solution the requisite quantity of sulphuric acid, a copious precipitate of baryta falls, and the filtered liquor is merely water, holding in solution the oxygenized acid, or deutoxide of hydrogen, combined with the acid itself.

ACIDIMETER. An instrument or apparatus wherewith to ascertain the strength of acids. (See Hydrometer.)

ACIDIMETRY. The estimation of the strength of acids.

Memo. This operation must be understood to refer to the relative strengths of the same acids, (viz. quantity of real acid of the same kind contained in the solutions examined,) and not to the comparative strengths of acids of different compositions or names. Theoretically, capacity of saturation is no proof of *strength of affinity*, or *acid power* in *different acids* in opposition to the views propounded by Berthollet. Thus, it takes 50 grs. of chalk, or 54 grs. of dry carbonate of soda to neutralize 37 grs. of real muriatic acid, but the same quantity is enough to neutralize 49 grs. of the strongest oil of vitriol, containing 40 grs. of real acid. It thus appears that a *less* quantity of *muriatic* than *sulphuric acid* is equivalent to any given weight of base, and according to Berthollet's theory, the former should be considered the stronger acid. The reverse is however the case, as oil of vitriol will take lime from its solution in hydrochloric acid. No absolute criterion of the scale of power, among the *different* acids, has as yet been discovered. The present article will be confined to methods of acidimetry applicable to the acids generally, but directions more especially adapted to the principal acids will be found under their particular heads. (See Acetimetry, Muriatic Acid, Sulphuric Acid, &c.)

Acidimetrical Processes. These are founded on the capacity of the acids to saturate the bases.

I. Place a weighed sample, say 100 grs. of the acid to be examined in a glass tube or other suitable vessel, and, if it be a strong acid, it is better to dilute it with six or eight times its weight of pure water, and if solid or crystallized, as citric or tartaric acid, to dissolve it in a like quantity. A weighed portion of dry powdered carbonate of soda or potassa prepared from the crystallized carbonate by exposing it to a red heat, is then *gradually* and *carefully* added, until the acid is saturated, which is known by its ceasing to effervesce, and to redden litmus paper. Great care must be taken not to exceed the quantity necessary for this purpose. After adding each portion of soda the solution should be well stirred up, and as soon as the effervescence becomes languid the greatest caution must be observed in adding fresh portions of the alkali. The proper point is arrived at when the liquid ceases to *redden litmus*, and does not *alter the color* of *turmeric paper;* if it turns the latter *brown*, too much soda has been added, and the operation becomes useless. As soon as the point of saturation or neutralization is arrived at, the remaining carbonate of soda is weighed, and its present deducted from its former weight will give the quantity consumed, every 53½ grs. of which will represent an equivalent of real acid, according to the following table, which I have arranged for the purpose.

Remarks. This method is sufficiently accurate for common purposes, but when greater exactness is required, the following plan is preferable: The reason for the adoption of the carbonate of potassa or soda is, that they have a uniform constitution when prepared in the way described as above. Either of the other articles mentioned in the table may, however, be used instead, if at hand, and known to be pure.

Table representing the quantities of the Carbonates of Soda, Potassa, Lime, Carbonic Acid, and Hydrate of Lime, equivalent to the given weights of some of the Acids, together with the composition of the latter, hydrogen being considered equal to 1.

53½ grs. of dry carbonate of soda,	50½ grs. pure chalk,
143½ „ crystallized ditto,	37½ " of hydrate of lime, (fresh,)
84½ „ bicarbonate of ditto,	44½ " of dry carbonic acid, (when the bicarbonate of potassa or soda is used for testing in the process of Fresenius and Will.)
69½ „ dry carbonate of potassa,	
100½ „ crystallized bicarbonate of ditto,	

are equivalent to

Grains.	Acid	Composition		
51·48	Acid, Acetic (anhydrous)	4 Carbon ...	(6·12×4)	= 24·48
		3 Oxygen ...	(8×3)	= 24
		3 Hydrogen ...		= 3
60·48	——— (crystallized or glacial)	1 Dry Acid ...		= 51·48
		1 Water ...		= 9
99·4	—— Arsenious (dry)	2 Arsenic ...		= 75·4
		3 Oxygen ...		= 24
114·68	—— Benzoic (dry)	14 Carbon ...	(6·12×14)	= 85·68
		3 Oxygen ...	(8×3)	= 24
		5 Hydrogen ...		= 5
34·9	—— Boracic (dry)	1 Boron ...		= 10·9
		3 Oxygen ...	(8×3)	= 24
52·9	——— (crystallized)	1 Dry Acid ...		= 34·9
		2 Water ...	(9×2)	= 18
22·12	—— Carbonic (dry	1 Carbon ...		= 6·12
		2 Oxygen ...	(8×2)	= 16
58·48	—— Citric (dry)	4 Carbon ...	(6·12×4)	= 24·48
		4 Oxygen ...	(8×4)	= 32
		2 Hydrogen ...		= 2
76·48	——— (crystallized)	1 Dry Acid ...		= 58·48
		2 Water ...	(9×2)	= 18
85·84	—— Gallic	7 Carbon ...		= 42·84
		3 Hydrogen ...		= 3
		5 Oxygen ...		= 40
127·3	—— Hydriodic (dry)	1 Iodine ...		=126·3
		1 Hydrogen ...		= 1
27·39	—— Hydrocyanic (dry)	1 Cyanogen ...		= 26·39
		1 Hydrogen ...		= 1
36·42	—— Hydrochloric (dry)	1 Chlorine ...		= 35·42
		1 Hydrogen ...		= 1
54·15	—— Nitric (dry)	1 Nitrogen ...		= 14·15
		5 Oxygen ...	(8×5)	= 40
72·15	——— (liquid, sp. gr. 1·5)	1 Dry Acid ...		= 54·15
		2 Water ...	(9×2)	= 18
36·24	—— Oxalic (dry)	2 Carbon ...	(6·12×2)	= 12·24
		3 Oxygen ...	(8×3)	= 24
63·24	——— (crystallized)	1 Dry Acid ...		= 36·24
		3 Water ...	(9×3)	= 27
71·4	—— Phosphoric (dry)	2 Phosphorus ...		= 31·4
		5 Oxygen ...		= 40
50·48	—— Succinic (dry, or anhydrous crystals) ..	4 Carbon ...	(6·12×4)	= 24·48
		3 Oxygen ...	(8×3)	= 24
		2 Hydrogen ...		= 2
40·1	—— Sulphuric (dry)	1 Sulphur ...		= 16·1
		3 Oxygen ...	(8×3)	= 24
49·1	——— (liquid, sp. gr. 1·845)	1 Dry Acid ...		= 40·1
		1 Water ...		= 9
66·48	—— Tartaric (dry)	4 Carbon ...	(6·12×4)	= 24·48
		5 Oxygen ...	(8×5)	= 40
		2 Hydrogen ...		= 2
75·48	——— (crystallized)	1 Dry Acid ...		= 66·48
		1 Water ...		= 9
215·16	—— Tannic	18 Carbon ...		=110·16
		9 Hydrogen ...		= 9
		12 Oxygen ...		= 96

II. Dissolve 100 grs. of the carbonate of soda or potassa, prepared as above, in 700 or 800 measures of boiling water, and when cold make the quantity up to exactly 1000 measures; this forms a test liquor, every 10 measures of which represent 1 gr. of the dry carbonate, and every single measure 1 tenth of a grain. A convenient graduated glass tube for this purpose is Gay Lussac's *pouret*, described under the article ACETIMETRY. This liquid must be applied to neutralize the acid, as described in the last process, and the quantity consumed for that purpose may be read off on the graduated tube.

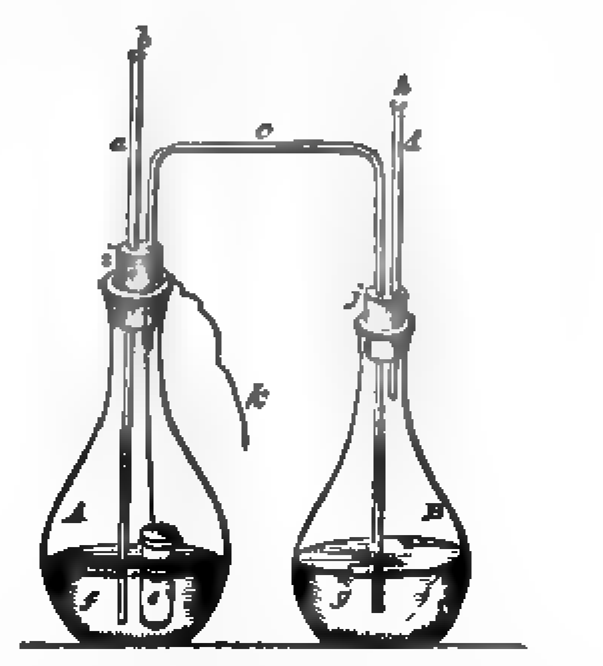
Remarks. This plan allows of the alkali being added with greater ease and in smaller quantities than can possibly be done with a powder. If the graduated portion of the *pouret* be divided into 100 parts, each of them will represent exactly one grain of the carbonate.

III. Dissolve 100 grs. of the dry carbonate of soda or potassa before described in 900 grs. of hot water, and when cold make it up to exactly 1000 grs. This forms a test liquor, capable of being applied with *great accuracy*, every grain of which will represent 1 tenth of a grain of alkali, and every 10 grs. will be equal to 1 gr., from which the real quantity of acid present may be ascertained from the preceding table, and by the simple rule of proportion the per centage may be found.

Remarks. The solution is best made and used in a bottle known as Schuster's Alkalimeter, described under the article ACETIMETRY. The operation is conducted thus: The sample of acid, being accurately weighed, is diluted or dissolved in 6 or 7 parts of water, and the bottle containing the test liquor is then carefully balanced in the scales and the weight noted. The contents of the latter are then added in small and successive portions to the acid until the point of saturation is approached, when great care must be observed lest too much be added. As soon as the exact point of saturation is arrived at, the bottle holding the test solution must be again accurately weighed, when its loss of weight, divided by 10, will give the number of grains of the carbonate consumed.

IV. (*Method of Drs. Will and Fresenius, of Giessen.*) *Explan.* This method depends upon the quantity of carbonic acid gas which a given weight of acid is capable of expelling from the bicarbonate of soda or potassa, which is estimated by the loss of weight in the apparatus, after the gas, rendered perfectly dry by passing through sulphuric acid, has escaped into the air, from which the quantity of acid present in the sample is found by a simple calculation.

Oper. A determinate amount of the acid under examination is accurately weighed into the flask A, fig. p. 22; and if it be a concentrated acid or a solid, it is mixed with or dissolved in 6 or 8 times as much water. The little glass tube *e* is then nearly filled to the brim with pure bicarbonate of soda in powder, and a fine silk thread is tied round the neck of the tube, by means of which it is lowered down into the flask A, so as to remain perpendicularly suspended when the cork is placed in the latter, the cord being held between the cork and the mouth of the flask. The flask B is about half filled with oil of vitriol, and the tubes being ranged in their places, as represented in the engraving, the whole apparatus is accurately weighed, time having been allowed for the mixture of acid and water to cool completely, should it have become hot by mixing. The cork in the flask A is then slightly loosened, so as to allow the little tube containing the bicarbonate of soda to fall into the acid, and is again immediately fixed AIR-TIGHT in its place. The evolution of carbonic acid now commences, and continues until the acid in the flask A is neutralized. When this takes place, which is easily seen by no bubbles being emitted on shaking the apparatus, the flask A is put into hot water, and kept there with occasional agitation until the renewed evolution of gas has completely ceased. The little wax stopper is then taken off the tube *a*, the apparatus taken out of the hot water, wiped dry, and suction applied by means of the mouth to the end of the tube *d*, until the sucked air no longer tastes of carbonic acid. The whole is then allowed to become quite cold, when it is replaced in the balance (the other scale still containing the original weights) and weights added to restore the equilibrium, which will thus give the exact weight of the dry carbonic acid gas that has been expelled from the bicarbonate of soda, by the action of the sample examined, from whence the quantity of *real acid* it contained is deduced by the following calculation:—*Two measures of carbonic acid* bear the same proportion to *one measure of the anhydrous acid* in question, as the amount of the *carbonic acid* expelled, does to the amount sought of *anhydrous acid*. Thus, let us suppose, for instance, we had examined dilute sulphuric acid, and obtained 3 grs. of carbonic acid, the arrangement would be $(22{\cdot}12\times2) : 40 :: 3 : 2{\cdot}72$. The amount of sulphuric acid operated upon, consequently, would contain 2·72 grs. of anhydrous acid. Let us suppose the weight of this amount to have been 15 grs., the sulphuric acid



A, A wide-mouthed flask, capable of holding 2½ to 3 oz. containing sample for trial, *f*.

B, Ditto, capable of holding 1½ to 2 oz., partly filled with oil of vitriol, *g*.

a c d, Tubes fitting air-tight in the flasks by means of the corks *i* and *j*.

b, Piece of wax fitting air-tight on the end of *a*.

e, Small tube capable of holding about 1 drachm of powdered bicarbonate of potash.

h, Open end of the tube *d*.

k, Silk cord fastened to the tube *e*.

under examination would contain 18·13 *per cent. of real acid;* for 15 : 2·72 :: 100 : 18·13. The quantity of acid in the sample may also be found from the preceding table, where it will be seen that 44¼ grs. of dry carbonic acid are equal to the respective quantities of the different acids, mentioned in the first and second columns, which by the simple rule of three may be converted into the strength per cent. The foregoing engraving is a sketch of the apparatus employed in this operation.

Remarks. This operation, though perhaps *apparently* complicated, is in reality very simple and easy to perform, when once understood. It is not absolutely necessary that the bicarbonate of soda be perfectly pure, so long as it does not contain any neutral carbonate or sesquicarbonate of soda. The absence of these salts is absolutely necessary, for which reason Messrs. Fresenius and Will direct the bicarbonate of commerce to be purified in the following manner:—For this purpose, half a pound to one pound of it is reduced to a uniform powder, and a portion of it first tested with perchloride of mercury; if the result be satisfactory, the powder is put into a glass jar, and covered with the same amount of cold rain water; it is then allowed to stand for twenty-four hours, with frequent stirring; the salt is then placed upon a funnel, the tube of which is stopped with loose cotton, so as to allow the ley to drop off; the salt is then washed several times with small quantities of cold rain water. The bicarbonate of soda, after this operation, is generally pure, and adapted for acidimetrical purposes. It is dried between some sheets of blotting-paper, without the aid of heat, and kept for use in a well-closed glass bottle. Before use, it may be again tested to ascertain its purity. The application of heat after the completion of the operation is indispensable, as, if it were neglected, from 25 to 30 milligrammes less of carbonic acid would be obtained. The bicarbonate of potassa may be used in this method of acidimetry with equal advantage as that of soda, provided it be pure; but in either case it is always proper to use an excess, so as to leave some undecomposed after the operation is concluded. A piece of litmus paper plunged into the liquid in A will not be reddened if the process has been properly managed.

General Commentary. The preceding sketch of the principal methods of acidimetry will, it is hoped, be found sufficiently explicit to be generally understood by workmen in laboratories, and by tradesmen and others to whom it may be an object to be able accurately and expeditiously to test the acids that pass through their hands. The methods Nos. II. and III., and especially the latter, combine the above requisites in an eminent degree, and if a quantity of the test solution of the proper strength be prepared as there described, it may be kept unharmed for any length of time, in a stoppered bottle, and will be always ready for application wherever a good pair of scales or a graduated measure is to be found. The only danger to be dreaded is over-saturation, and this may be avoided by care and attention. A good method is to tint the acid sample with a few drops of litmus, as described under Alkalimetry, when it will assume a reddish shade, which will gradually deepen into purple as the point of saturation is approached, and recover its blue color as soon as this point is arrived at. To see that this point is not passed, a piece of turmeric paper may be dipped into the solution, which will retain its color if neither acid nor alkali predominate, but if the latter be in excess, will become brown, as before described. The ingenious and elegant method of Fresenius and Will, for which the English reader is indebted to Mr. Bullock, though admirable in the hands of a person accustomed to chemical manipulations, appears somewhat difficult to mere *practical* men, and is liable to failure in their hands. The results, however, if the process be properly conducted, are unimpeachable.

In commerce, the strength of acids is frequently reckoned with reference to a standard, termed 100 acidimetric degrees. This is taken from the circumstance that 91 grs. of commercial oil of vitriol, of a sp. gr. of 1·845, exactly saturate 100 grs. of dried carbonate of soda, and hence is said to be of 100 acidimetrical degrees. Any other acid requiring only 35, 50, or any other number of grains of the carbonate to saturate it, would in like manner be termed so many degrees strong, the number of grains representing in every case an equal number of degrees. This method of testing acids is a modification of that introduced by the French chemists, and though of course only conventional, and principally confined to commercial purposes, is especially adapted to practical men but little conversant with chemistry, yet very ready in retaining or calculating any thing on the centesimal scale, from its similarity to monetary language and reckoning.

All the liquid acids admit of being tested, with more or less accuracy, by ascertaining their sp. gr., and where this plan is applicable, it will be described in its alphabetical order.

In conclusion, it may be remarked, that when the acid is costly or scarce, a small quantity may be examined as easily as a larger one. Thus, instead of 91 grs. mentioned above, (when speaking of acidimetric degrees,) any fractional portion of that weight may be employed instead: 13, 26, 39, or 52 grs. will yield similar results, by merely multiplying the quantity of dried carbonate of soda by 7 .$\frac{7}{2}$.$\frac{7}{3}$ or $\frac{7}{4}$, accordingly as 13 grs. or any of the following numbers have been used; in either case the product will be in acidimetrical degrees. The centesimal method of calculation admits of various useful applications, by means of the Simple Rule of Three.

ACONITE. *Syn.* Wolfsbane, Monkshood, Aconitum napellus. *Caution.* As several articles which follow are made from this plant, it may be necessary to caution parties against the dangerous character of itself and preparations. A fatal case of poisoning by eating the root instead of horseradish is recorded by Dr. Pereira, and more recently twelve persons were poisoned by swallowing ninety grains each of extract of aconite, instead of ext. cochleariæ, three of whom died, and the rest barely escaped losing their lives. (Memoriale della Medicina contemporanea.) *Officinal portions of the plant.* The root and leaves (of the aconitum paniculatum) are the parts ordered to be used by the London college, while the Dublin college orders only the leaves. The aconitum napellus, an equally active species of aconite, is the

one employed for medical purposes in England, the aconitum paniculatum not being procurable in any quantity. (Pereira, Thompson.) *The leaves* should be gathered as soon as the flowers appear. *The root* should be taken up in autumn. When the whole plant is employed, it should be gathered as soon as the flowers begin to open. Herb collectors should be particular as to the period at which they gather the several parts of this plant, as its strength (quantity of aconitina) varies considerably with the time of the year.

ACONITE, EXTRACT OF. *Syn.* Ext. of Wolfsbane, Inspissated Juice of Aconite.

I. (*Extractum Aconiti,* P. L.) *Proc.* Bruise the fresh leaves of aconite, previously sprinkled with water, in a marble mortar, then express the juice, and without depuration, evaporate to the consistence of an extract

II. (*Ed. Ph.*) Beat the fresh leaves of aconite to a pulp, and express the juice; then subject the residuum to percolation with rectified spirit, until the latter passes through without being materially colored; unite the expressed juice and the percolated tincture, filter, distil off the spirit, and evaporate in a vapor or water bath.

Remarks. A variable and uncertain preparation. Numbness and tingling should follow its application to the lips or tongue, if it be of good quality. The extract of the Ed. Ph. is stronger than that of either the London or Dublin. The two latter are prepared in the same manner. *Prod.* 1 cwt. of fresh leaves yield 5 lb. or 6 lb. of extract. *Prop.* Anodyne, sudorific, and narcotic; *very poisonous. Dose.* ½ gr. to 4 grs. once or twice a day, in neuralgic pains, &c.

ACONITE, EXTRACT OF, (Alcoholic.) Make a tincture by macerating the fresh leaves of aconite in twice their weight of rectified spirit, for 14 days; express, filter, and evaporate in a water bath.

Prop. Similar to the last, but much more powerful. It has been exhibited internally in the form of pills, and used externally combined with ointment or plaster. *Dose.* One-twelfth to one-sixth of a grain every three hours.

ACONITE, PILLS OF EXTRACT OF, (Alcoholic.) *Prep.* Alcoholic extract of aconite, 1 gr.; liquorice powder, 12 gr.; simple sirup or mucilage, q. s. *Proc.* Mix the first two articles with enough sirup to form a mass, then divide into six pills. *Dose.* One pill every three or four hours.

Remarks. The utmost care must be taken in weighing and mixing the *ingredients accurately.*

ACONITE, PLASTER OF, (Spread.) Curtis. *Prep.* Gently evaporate the tincture of aconite to the consistence of a soft extract, then spread a very small portion over the surface of a common adhesive plaster. *Use.* Mr. Curtis of Camden-town has strongly recommended this plaster in neuralgia. *Remarks.* A little of the alcoholic extract may be employed with equal success to that obtained fresh from the tincture.

ACONITE, OINTMENT OF. (Dr. Turnbull.) Mix one part of the alcoholic extract with two parts of lard. Employed in neuralgia, &c.

ACONITE, POWDER OF. *Prep.* Dry the leaves cautiously by means of a current of warm dry air, and at once reduce them to powder; place the product in dry vials, which must be well corked, and kept in an obscure place.

Use, Dose, &c. It has been given in doses of 1 to 2 grs. in neuralgia, rheumatism, gout, scrofula, syphilis, &c., but its employment requires great caution.

Remarks. This powder is very liable to spoil by keeping, and unless recently and carefully prepared, can hardly be depended upon If the quality be good, a numbness and tingling of the tongue and lips will follow soon after tasting it.

ACONITE, SOLUTION OF. *Prep.* Dissolve 4 scr. of extract of aconite in 30 scr. of antimonial wine.

Remarks. This preparation is highly extolled by Drs. Richter and Busse in rheumatic affections, especially of a chronic kind, as well as dental pains of a similar nature. *Dose.* 15 to 25 drops every two hours, gradually raised to 40 or 60 drops, in chronic rheumatic pains, toothache, cramp of the stomach, &c. (Hufeland's Journal.) 1 dr. of the extract to ℥j of the wine would be more convenient proportions, and but very slightly vary from the above.

ACONITE, TINCTURE OF. I. (Pereira.) *Prep.* Reduce lb. i of newly dried root of aconite to a coarse powder, and digest it in 1½ pint of rectified spirit of wine for 14 days; then express the tincture and filter. *Dose.* 2 to 5 drops three times daily (carefully watching its effects) in rheumatism, gout, syphilis, &c., where a narcotic sedative is indicated. *Remarks.* Diluted with water it forms an excellent embrocation in rheumatism, neuralgia, &c. Applied by means of a small sponge, tied to the end of a stick or glass rod. This formula is nearly the same as Dr. Turnbull's.

II. (A. T. Thompson.) *Prep.* ℥ij of the leaves or root to 1 pint of rectified spirits of wine. As above. *Dose.* 5 drops, gradually increased to 10 and upwards to 30 or 40.

III. (Kempf. & Pol. Ph.) *Prep.* Dried leaves of aconite ℥j, proof spirit ℥viij. As above. *Dose.* 5 to 10 drops and upwards.

IV. (P. Codex.) *Prep.* Dried leaves of aconite ℥j, proof spirit ℥iv. As before.

ACONITIC ACID. An acid, discovered by Peschier in the aconitum napellus, and by Braconnot in the equisetum fluviatile. It exists in the juice of the aconite combined with lime.

Prep. Express the juice from the aconitum napellus, previously bruised and sprinkled with water, filter, and add a solution of acetate of lead; collect the precipitate on a filter, wash it well with *cold* distilled water, then place it in a glass vessel with pure water, and pass sulphureted hydrogen gas through the vessel until the whole of the lead is thrown down; lastly, filter and evaporate. It may be purified by resolution in ether.

Prop. A white, odorless, semi-crystalline mass; it tastes sour, dissolves in alcohol, ether, and water, and unites with the alkalis to form soluble aconitates, and with the metallic oxides, salts that are wholly or nearly insoluble in water.

Remarks. It appears to be identical with the true pyrocitric acid obtained by Berzelius and Dahlstroom from citric acid.

ACONITINA. *Syn.* Aconitia. Aconita. Aconitin Aconitine. One of the new vegeto-alkaline bodies to which chemists have given the

generic name of alkaloid, discovered by Gieger and Hesse in 1833. It exists in a greater or less quantity in every species of the genus aconitum, but the aconitum napellus is that usually employed in England. The alkali is found in every part of the plant, but more especially in the roots, where it is combined with a peculiar acid, (aconitic.)

Prep. (*Process of the London Ph.*) *Ing.* Root of aconite, dried and pounded, lbs. ij; rectified spirit 3 gals.; dilute sulphuric acid, solution of ammonia, purified animal charcoal, of each a sufficient quantity. *Proc.* Boil the aconite with a gallon of the spirit for an hour in a retort to which a receiver is annexed; pour off the liquor, and what remains again boil with another gallon of the spirit and the recently distilled spirit, and pour off this liquor. Let the same thing be done a third time. Then express the aconite; and all the liquors being mixed and strained, let the spirit distil: evaporate what remains to the consistence of an extract. Dissolve this in water, and filter. Evaporate the liquor by a gentle heat, so that it may acquire the consistence of a sirup. To this add of dilute sulphuric acid mixed with distilled water, a sufficient quantity to dissolve the aconitine. Next drop into it the solution of ammonia, and dissolve the precipitated aconitine in dilute sulphuric acid, mixed with water as before. Then add the animal charcoal, thoroughly shaking the vessel every quarter of an hour; lastly, strain and again drop in the solution of ammonia, in order to throw down the aconitine; wash and dry.

II. M. Hesse has obtained this alkaloid by adding hydrate of magnesia to the decoction of the dried leaves of the aconitum napellus, washing the precipitate thus formed with water, drying, and then treating it with boiling alcohol, which dissolves out the aconitina, and deposites greater part of it again on cooling, and the remainder by gentle evaporation.

Prop. Pure aconitina is generally in the form of a white odorless powder, soluble in 150 times its weight of water at 60°, and in 50 parts at 212°. It dissolves freely in hot alcohol and ether, and in the dilute acids forming salts. By the formation and decomposition of the latter, it may be obtained very pure, when it will crystallize from its alcoholic solution submitted to spontaneous evaporation. In this process much, however, is left behind in the mother liquor, and suffers decomposition.

Uses. Dr. Turnbull is the only practitioner who has employed this substance as a medicine in England. He recommended it in very minute doses, in the form of pills, for neuralgic affections, and externally made into an embrocation and an ointment. The danger attending its internal exhibition, from the slightest error or want of skill in dispensing it, has lately induced even Dr. Turnbull to cease to employ it in that way.

Pur. There is a spurious article imported under the name of aconitina, which sells for about 3d. a grain, but possesses none of the properties of that prepared by Mr. Morson. It has a yellowish gray color, is only partially soluble in alcohol and ether, and leaves a white calcareous ash, when burnt in a capsule of glass or platina. The London College say that it should be "largely soluble in sulphuric ether, less so in alcohol, and nearly insoluble in water." "It is totally destroyed by heat, leaving *no salt of lime.*"

Remarks. This is one of the most poisonous substances with which we are acquainted. Too much caution cannot, therefore, be taken in every thing that concerns it. It is stated that so small a portion as the one-fiftieth of a grain of Mr. Morson's aconitina has endangered the life of an individual. (Pereira, Thompson.) The young dispenser should be very careful to satisfy himself as to the nature of the termination of the Latin word, when dispensing this subtile article. The word *aconiti*, in loose writing, may greatly resemble the name of the alkaloid, to the unaccustomed eye; but the adoption of the latter article for the former would certainly doom the patient to an untimely grave, and subject the dispenser to all the inconvenience of legal proceedings. It is scarcely necessary to caution the inexpert and careless to avoid this article altogether. There is but one maker in England, and that is Mr. Morson; and the price at which he sells his preparation (3s. 6d. a grain) will give some idea of the danger and difficulties attending its manufacture. This alkaloid is said to possess "extraordinary power in some affections, and would doubtless be very extensively employed, were it not for its extreme costliness." The reason for introducing this article into the L. P. when *so many others, in general use among practitioners, are omitted*, remains a problem which it has been attempted in vain to solve.

ACONITINA OINTMENT. (Turnbull.) *Prep.* Aconitina, 16 grs.; alcohol, 12 drops; olive oil, ʒss; lard, ℥j. *Proc.* Rub the alkaloid with the spirit, then add the oil by drops, and after it is thoroughly mixed, pour in the lard rendered *nearly liquid* by heat; stir well until cold. *Use.* A *small* portion is applied by the tips of the fingers and gentle friction, in neuralgic and rheumatic affections, &c.

ACONITINA, SOLUTION OF. *Syn.* Embrocation of Aconitina. (*Turnbull.*) *Prep.* Dissolve 8 grs. of aconitina in f℥ij of spirit of wine. *Use.* As an embrocation in the above cases. It should be applied by means of a sponge fastened to the end of a stick or glass rod.

Caution. Neither this nor the preceding article, nor any similar preparation of the alcoholic extract, should be used if the skin be abraded.

ACORUS. *Syn.* Sweet Flag. Calamus aromaticus. Ac. verus. Ac. Asiaticus. Ac. calamus. The root of this plant has been employed in medicine ever since the days of Hippocrates. It has been recommended in ague, and combined with bitters in dyspepsia, &c. It is generally taken in the form of *infusion or powder.* The former is made by digesting 1 oz. of the bruised root in 1 pint of boiling water for an hour in a covered vessel. The dose is a teacupful. *The powder* is given in doses of ℈j to ʒj once or twice a day.

Remarks. By distillation with water, the fresh root yields a fragrant *essential oil*, used in perfumery and for flavoring spirit. It is sometimes given in stomach complaints: 1 drop on a piece of sugar. *A fragrant water*, also used for similar purposes to the infusion and oil, is made by distilling 1 lb. of the root along with 2 gallons of water, drawing over only 1 gallon.

ACROLEINE. When fixed oils are exposed to a heat sufficient to produce ebullition, acroleine, mixed with carbureted hydrogen, is given off. By passing the vapor through a series of well-cooled bottles, partly filled with water; and by redistilling the contents of the second and third bottles, this substance will be obtained in the form of an oily liquid, possessing a very disagreeable odor. It has never been obtained in an isolated state, and little is known concerning its precise composition.

ADIPIC ACID. One of a series of new acids discovered by Laurent, among the products of the oxidation of oleic acid, by means of pure colorless nitric acid.

Prep. Gently evaporate the mother liquor, left from the process of preparing pimelic acid, set it aside for some days, and then collect the crystals deposited; repeat this operation until the liquor ceases to yield crystals. Then dissolve them in hot water, skim off the oil, filter, evaporate, and crystallize. Dissolve in ether, and evaporate to one half; collect the crystals and repeat the process a second time; next dissolve the two crops of crystals separately in alcohol, when adipic acid, in roundish crystalline grains, and dipic acid, in plates, will be obtained.

Prop. Color brown, soluble in hot water, volatile above 266°. It unites with the bases, forming salts called adipates, which are mostly soluble.

ADIPOCERE. *Syn.* Adipocera. (Adeps *Fat*, and Cera *Wax*.) Grave Wax. *Hist.* On the removal of the bodies from the Cimetière des Innocens in Paris, in 1786, it was found that they were for the most part converted into a substance resembling spermaceti, to which the name of adipocere was given. Fourcroy was the first who submitted this substance to a scientific examination, though it is said to have been previously known to grave-diggers, and that it is even mentioned by Lord Bacon.

App. It was proposed by Lavoisier to produce this substance artificially, for the purposes of the arts. Dr. Gibbs of Oxford found that lean beef, suspended in running water, was converted into fat (adipocere) at the end of a month. Three pieces of lean mutton were immersed in each of the three mineral acids, in separate vessels. At the end of three days, that in the nitric acid had changed into a soft fatty matter; that in the muriatic was less altered; while that immersed in the sulphuric had become black and carbonized. Attempts have been made to convert the dead bodies of cattle (carrion) into adipocere, for the purposes of the candlemaker and the soap-boiler, but without success. From the experiments of Von Harkhol, extending over a period of 25 years, it appears that the carcasses of mammalia, immersed in running water, are after a lapse of three years converted into a pure, hard, scentless fat, resembling white wax, perfectly fit for the manufacture of soap and candles. Exposure to stagnant water gives more fat, but of an impurer kind. For further information on this subject, the reader is referred to 'Ure's Chemical Dictionary,' and to the 'Dictionary of Arts, Manufactures, and Mines,' by the same author.

ADULTERATION. The fraudulent corruption of pure articles, by admixture with others of less value, for the sake of greater gain. The means of detecting the adulterations generally met with in trade, will be found explained, under each article of importance, in its alphabetical order.

ÆGIRINON. A once popular ointment, made by macerating the fruit of the poplar, in six times its weight of melted lard, and straining. It is much employed in some parts of the Continent.

ÆSCULINE. A new alkaline substance, said to have been found in the horse-chestnut. It is probably extractive matter combined with lime.

ÆTHIOPS. *Syn.* Ethiops. A name give by the older chemists to several black powders on account of their color. (See the following articles.)

ÆTHIOPS, ANIMAL. This was a powder obtained by burning various animals, as the hedgehog, mole, sparrow, &c., to a cinder.

ÆTHIOPS, ANTIMONIAL. *Syn.* Ethiops of Antimony. Æthiops antimonialis. *Prep.* Sulphuret of antimony, two parts; quicksilver, one part. *Proc.* Triturate until the globules are extinguished. *Dose.* 3 to 5 grs., gradually raised to a scruple, in some cutaneous diseases.

ÆTHIOPS, GOLDEN. *Syn.* Æthiops auripigmentum. This æthiops is made by triturating together the red sulphuret of arsenic and metallic mercury. It is poisonous, and is never employed in medicine at the present day.

ÆTHIOPS, JOVIALIS. Prepared by rubbing together equal parts of tin, quicksilver, and sulphur. It was once given in skin diseases.

ÆTHOGEN. A compound of nitrogen with boron, named from its combinations with the metals, producing a phosphorescent light, in the oxidating flame of the blow-pipe.

Prep. Mix seven parts of powdered anhydrous boracic acid, with nine parts of melon, place the mixture in a crucible lined with charcoal, and apply heat, then transfer the product into a well-stopped vial. (Balmain.)

Prop. A light powder, resembling magnesia, infusible, and nearly insoluble in water. It forms compounds with the metals, called æthonides. These may be prepared by either exposing a mixture of the metal and æthogen to heat, or a mixture of the cyanide of the metal with boracic acid

AGRICULTURE. (From *ager*, a field, and *colo*, I till.) The art or business of the farmer; the cultivation of the soil in large quantities, for the purpose of raising crops and live stock. In its more extended sense, it includes *road-making*, *embanking*, *draining*, *planting*, *&c.* It is one of the most important of the useful arts, and when combined with chemistry is not unworthy of the name of science. The following short sketch of the history and principles of agriculture is from the pen of J. C. Loudon, F. L. S., H. S., &c.

Hist. "*The origin of agriculture* may be traced to remote antiquity, and was doubtless coeval with that of fixed property. In the primeval state of society, the sole riches of the husbandman consisted of flocks and herds, which were kept in a state of movement from one point to another, in search of pasturage and water; but as population increased, mankind adopted a fixed abode; this could only be done by bestowing on the site a certain degree of labor and care, which became as it were the *price paid* for constituting it *private property*. At this point in the progress of civiliza-

tion, agriculture may be said to have commenced. Previously, the natural products of the soil were merely consumed where they were found, but *now* men sought to increase them by culture.

"*The culture of land* will be found to have depended in every country principally on its climate and civilization; though partly also on its government and population. In the warmer climates, where nature produces fruits in the greatest abundance, for the food of both men and animals, and where very little care is required to procure shelter or clothing, agriculture has made but little progress; because it is comparatively unnecessary for the prosperity of the inhabitants. In climates of a directly opposite character, agriculture has made equally slight progress, from the natural obstacles opposed to it. In such countries, for example, as Greenland and Kamschatka, only one or two kinds of corn crops can be cultivated, and perennial grasses can scarcely exist; because the ground is covered with snow for eight months of the year; and in these countries agriculture is but little practised, as the chief resources of the inhabitants for food are found in the sea and forest. In intermediate climates, such as those of South Britain, the middle of France, and the North of Italy, the soil may be labored by man throughout the whole year, and there is scarcely any limit to the kind of crops which may be raised on it. In such climates, agriculture is calculated to attain the highest degree of perfection; and comparing different parts of the zones of this description of climate in both hemispheres, perhaps it may be asserted, that *the best agriculture in the world is to be found in Britain and the North of Italy;* viz., in *East Lothian* and *Norfolk*, in the *Vale of Arno* and on *the banks of the Po*. The kind of agriculture practised in different countries is also of course adapted to the difference of climate. Thus, towards the North Pole, the great art of the cultivator would be to increase the heat; or, rather, in adopting such measures as would best guard plants and animals against cold, rains, and the vicissitudes of the weather. Towards the south, on the other hand, the art of the cultivator would be chiefly directed to moderating the extreme heat and supplying moisture. It thus appears that the agriculture of any country depends on its latitude; and that in high and low latitudes, where there are greater extremes of climate and temperature to contend with, agriculture must be of a more difficult and hazardous description than in intermediate or more temperate climates, such as that of Syria, where the art is supposed to have originated, or in Europe, where it may be considered as having attained its highest degree of perfection.

"In tracing the progress of this art in civilized countries, we have only to follow the chronology of general history. As the Greeks and Romans appear to have arrived at as great a degree of perfection in legislation as the moderns, so they appear to have attained nearly equal excellence in the practice of agriculture. Till within the present century, very little difference existed between the most approved agriculture of climates analogous to that of Italy, and the agriculture of the Romans as described by Cato, Columella, and other ancient writers. The chief superiority of the moderns consists in their machinery, and in their knowledge of the *science* of the art; the last being of very recent date, and by no means general among practitioners, (farmers.) By science, improved breeds both of plants and animals have been originated, and by modern machinery a more perfect tillage has been produced, and also a more complete separation of the produce from the soil, from the refuse of the plants which bore it, and from all impurities.

"*The history of British agriculture* begins with the Roman Conquest. Julius Cæsar found the inhabitants in a state of semi-barbarism; but Agricola left them in possession of all the arts of civilization then known. Agriculture declined with the invasion of the Saxons; but was preserved through the dark ages after the establishment of Christianity by the intelligence of the religious establishments, who gradually became possessed of the greater portion of the landed property of the country. Agriculture revived in the reign of Henry VIII., and in that of Elizabeth, during the long peace which then prevailed, and the consequent security of property; and it afterwards declined during the civil wars; it again revived during the reigns of William and Mary, Queen Anne, and George I., in consequence of the introduction of the Flemish husbandry, which included the culture of turnips and clover. A still greater stimulus to the art was given during the reign of George III., by the introduction of ploughs drawn by *two* horses, instead of *four* or *six;* of the drill system, and its application to the culture of turnips and potatoes; and by the improvements made in the breeding and rearing live stock, by Bakewell and Culley. Early in the present century, the threshing-machine was an important addition to agricultural machinery; the reaping-machine, the frequent drain system, and the subsoil plough, are improvements just coming into use; and the next grand attempt will probably be the general application of steam, instead of horses and cattle, in tillage and other field operations.

"*The principles of agriculture* are derived from a knowledge of the nature of plants and animals, of soils and manures, and of the climate, the seasons, and the weather. Plants are organized beings, which take up their food by means of roots, from the interior of the soil;* animals are organized beings, which select their food from vegetables growing on the surface of the soil, or from other animals, and this food is prepared before being absorbed into their system, by means of a stomach. The climate of a country determines both the plants and the animals which can be produced in it; and the seasons and the weather, the times when the plants and animals of the given climates are in particular states of vigor or torpidity; and when certain operations of culture can be performed on them or on the soil.

"The nature of these elementary materials being understood, even though imperfectly, certain improvements can be effected in them by art, which are greatly conducive to the increase of agricultural produce. The kinds of plants and animals suitable to any given climate, soil, or season, are determined by the laws of nature; but from among these kinds it is in the power of man to

* And by means of their leaves from the atmosphere.—A. J. C.

make a selection; and with the plants and animals so selected, to originate others, adapted to his purposes in a superior degree. Hence the importance of selecting certain breeds of animals, rather than others, and of making choice not merely of *one* kind of bread corn rather than another, but of *particular varieties of that corn.* Thus, in the case of wheat, there are some kinds, the grains of which, under no circumstances, weigh *more* than from 50 to 55 lbs. per bushel; while there are others which never weigh *less* than 60 lbs. a bushel. The nourishment of plants has been found to depend chiefly on organized matter contained in the soil, and produced chiefly by the decay of other plants. This is a law of nature, which, followed up by man, has led to the use of manures; as the fact everywhere observed, that no plant can live without water, has led to irrigation; and, as the observation that the excess of water is injurious, has led to surface and under-draining. *The influence of temperature and shelter* over the growth of plants, and the thriving of animals, is everywhere observable in wild nature; and though the temperature of a climate cannot be changed, yet that of most localities may be improved by shelter from cold winds, and by diminishing evaporation from the surface, by means of surface and under-draining, to draw off the superfluous water. The most important principles in the theory of agriculture are those which relate to the improvements of plants and animals, and of the soil.

"*The improvement of the soil* may be comprised under two heads,—*the improvement of its earthy part;* and *the increase of the organized matter added to the earth.* The improvement of the soil, considered as a mixture of different earths, consists in rendering it more or less retentive of water, by diminishing or increasing the size of the particles of which it is composed: for example, by the addition of clay in some cases, and of sand in others; and by improving the earthy condition of the soil, by the addition of such earths as may be in too small quantities, or absent altogether. It has been found, from experience, that those soils which are composed of *several* primitive earths are naturally more productive than those that consist of only *one* earth, all other circumstances being the same; and it has also been found that no soil will maintain its fertility, for any length of time, that does not contain a certain portion of calcareous earth in its composition. Hence, one of the most common plans of improving all soils not calcareous, is by the addition of lime; and of all other soils by mixing them with such as are of an opposite description.

"All soils are rendered more productive by the addition of organized matter, or what are called *manures.* Manures may be either composed of animal or vegetable matter; and these may be either applied separately or together, and in a fresh state or in a state of decay. It has been found from experience, and explained from chemical experiments, that every description of manure is rendered more effective by being made to undergo the putrefactive fermentation before it is applied; and this process is carried on with solid manures, in heaps or dunghills, and with liquid manure in tanks or wells. In the application of manure to soils, the great object of the cultivator is to apply *enough for the ensuing crop, and as little more as possible;* because all that is applied and not immediately used, is liable, to a certain extent, to have its particles carried off by evaporation (volatilization) into the atmosphere, or by rain into rivers or the sea. But even if this were not the case, to apply manure to a soil where it would not be immediately turned into a crop, would be an expenditure of capital without interest."

Draining, or "the operation of freeing a soil from superfluous water, is of equal or perhaps more importance than supplying it with manure; because, though without manure, plants will not grow with *great* luxuriance and *vigor*, yet with *too much* water, *they will not grow at all*, or *will become sickly.* The excess of water may proceed from three causes: an extremely moist climate, the only alleviation to which is arranging the surface with frequent furrows, and short slopes between them, so as to carry off the rain as soon as it falls; a soil very retentive of moisture, so as to hold it like a sponge, in which frequent under-drains, as near together as the surface furrows, are required; and, lastly, a soil lying over a subsoil abounding in springs, or, in other words, which has the substrata charged with water, which is continually oozing out through the surface soil. The remedy for this last evil is, by under-drains of considerable depth, so arranged as to collect the water from the substrata, and carry it off before it reaches the surface soil."

Comminution and labor tend considerably to promote the fertility of soils. "After draining, and being rendered of a proper texture and composition, by the admixture of such earthy ingredients as may be wanting, a soil requires, to render it fit to be easily penetrated by the roots of plants, to be frequently stirred and comminuted. This is done by the mechanical operations of ploughing, harrowing, &c., which, aided by the alternate action of droughts and rains, frosts and thaws, and summer and winter, have the effect of pulverizing the soil. To maintain a soil in a fertile state, it is not only necessary to supply it with manure, in proportion to the crops which have been carried from it, but to *vary* the crops which it is made to produce. It has been found, from experience, that crops of plants belonging to the *same natural family do not succeed so well after each other*, as when *crops of a different family* are made to intervene. Thus, the several grasses alternate better with root or herbage crops, than with one another; or, one of those grasses of which the seed is ripened will alternate better with another in which the herbage only constitutes the crop, than with one of the same kind as itself. Something analogous to the succession of crops takes place also with regard to the pasturage of animals, and it is found advantageous to put cattle in a field that has been grazed by horses, rather than to put *horses* after *horses*, or *cattle* after *cattle.*

"Thus, the *principles of agriculture* may be comprised under the *selection of breeds of plants and animals;* the *improvement of the soil and subsoil;* the *culture or movement of the soil;* the *improvement of the local climate by shelter and drying;* and the *succession of crops.* All these principles have been derived from experience; and they are only partly accounted for by chemistry

or natural philosophy. They are not, however, on that account, the less true and useful. It is singular that they should all have been known to the Romans, and, to all appearance, as fully as to modern cultivators.

"*The practice of agriculture*, in Britain, may be included under the heads of the *choice, hiring, and stocking a farm;* and ITS GENERAL CULTURE AND MANAGEMENT. In the *choice of a farm*, in any given county, the soil is of the greatest importance; because, though this may be so improved by art and expense, as almost to render a bad soil equal to a good one, yet in practice this would be so expensive as by no means to answer the purpose of the farmer. It may be thought that the vicinity of good roads, of a canal, a river, or a market town, are objects of more importance than the nature of the soil; but this is not the case, because, supposing the roads to be bad and the markets at a distance, it is only necessary to change the system of cultivation and management, and to turn the produce of the farm into some description of live stock, which may be driven to any distance, even over a country without roads. If it be alleged that the nature of the climate is of paramount importance to the soil, in the choice of a farm, we allow that in an extended sense it is; for example, if a cultivator had the choice of any part of Europe, there are doubtless many districts where the climate is far more favorable for all the operations and products of agriculture than others; and if even he had the choice of every part of Britain, he might find some localities much more favorable than others. In general, however, the actual choice of any cultivator lies within a *given* locality, where the climate, in a practical point of view, is everywhere the same. Next to *soil* and *climate* in the choice of a farm, the *state of the buildings and fences* on it, the *state of the roads*, and the *distance from a market town, a canal, or a seaport*, are of importance. Without buildings of sufficient extent, and properly situated, and of the proper kinds, the business of a farm cannot be carried on; and though some farms and some kinds of farming may be conducted without fences, yet, in general, fences are as necessary as roads. The last circumstance which we shall notice in this cursory glance, is the *nature of* THE TENURE by which the farm is to be held, and on the covenants and conditions of the lease. No cultivator who calculates on the employment of considerable capital, will risk it on lands of another, without some security for having it returned; and this security is a lease for a fixed number of years. On the other hand, no proprietor of lands will delegate the possession of them to another, for a fixed number of years, without a valuable consideration; and this he reserves to himself in the lease, under the denomination of rent. As lands in a state of cultivation, and buildings and fences in a state of repair, are liable to be injured and deteriorated in value by bad management or neglect, the proprietor guards against these accidents by certain conditions in the lease.

"*The culture and management* of a farm depend jointly on the soil and climate, and on the kind of produce most in demand and reckoned most profitable. In the mountainous districts of Great Britain, where the climate is cold, almost the only kind of farming practised is that of breeding and rearing different kinds of live stock, such as sheep or cattle, which are sold for being fattened in more favorable districts; or horses, in order to supply the demand for these animals for the purposes of draught or saddle. The mountainous districts of Scotland and Wales are chiefly devoted to the breeding and rearing of sheep and black cattle, which are sold to the farmers of the low countries, in both kingdoms, in order to be fattened for the shambles. The hilly districts of Yorkshire and Lancashire are chiefly employed in breeding and rearing of horses. In the low country of the *east* coast of Great Britain, the climate being dry, is favorable to the culture of corn; while on the *west* coast, and in *Ireland* generally, the climate being moist, is more favorable to pasture.

"*The farm products* most universally in demand are corn and butchers' meat, and these may be produced on every farm, the soil of which admits of being kept alternately in tillage and in grass. Butchers' meat may be produced in much greater abundance on such soils as admit of the culture of root and herbage crops, such as turnips, potatoes, and clover; while corn may be produced most abundantly in strong, loamy soils, within reach of extensive sources of manure. The most profitable description of crop will frequently be found to be different from that which is in most general demand; for example, in the neighborhood of a large town, the culture of culinary vegetables, on a large scale, in what are called *farm gardens*, is generally far more profitable than the raising of corn or butchers' meat. Even the raising of food for cattle, in such situations, is found to yield more profit than ordinary farming. There are also particular crops which may be occasionally cultivated, which yield *extraordinary profits;* such as drugs used in dyeing, or in some manufacture not common; plants of some new and improved variety of the kinds in general cultivation, for their seed, &c.

"*The agriculture of Britain*, and especially that of the low countries of Scotland, *excels that of most other countries having similar climates*, from the superior skill, intelligence, and capital of the farmer; the considerable length of the lease which is granted by the landlord; the superiority of the implements and machines employed; and the improved breeds of animals and plants which are reared or cultivated. Perhaps the nearest approach to perfection in the culture of arable land, in any part of Britain, is made in some parts of East Lothian; where, in consequence of deep-ploughing, substituting under-drains for furrows, regularly supplying manure, and alternating *cleaning* and *restoring crops* with *exhausting crops*, as great an amount of produce is obtained as can stand on the surface at *one* time. The agriculture of Britain is most defective in the southern districts of the island, in consequence of the farmers being the very opposite of those in the northern districts, the want or the shortness of the leases, and the restrictive clauses of those leases, by which the tenant is prevented exercising his own judgment, and is obliged to follow the routine prescribed in the leases of a former age."

For further information on this important subject the reader is referred to the 'Cyclopædia of Agriculture,' which contains the best system of

practical agriculture extant. The scientific agriculturist is also especially advised to peruse the 'Agricultural Chemistry' of Liebig, which explains the application of chemical science to the purposes of the farmer, and the improvement of the soil, and contains much that is valuable of a scientific description connected with agriculture. The principles and practice laid down in these important works, if applied with only moderate skill and industry, cannot fail to produce a degree of success, unattainable by mere unassisted experience. Several articles will also be found in this Cyclopædia, containing information respecting farming. (See the heads FARMING, MANURES.)

AGRIMONY. *Syn.* AGRIMONIA. AGRIMONIA EUPATORIA. A common field plant flowering in June and July. It is frequently given in the form of infusion or powder, in certain skin diseases, especially the itch. It is tonic and stomachic.

AGRIMONY TEA. *Syn.* INFUSION OF AGRIMONY. *Prep.* Pour 1 pint of boiling water on 1 oz. of the fresh tops of agrimony (gathered before the flowers are formed) and 1 oz. of liquorice root, (sliced,) macerate for one hour in a close vessel and a warm situation, then strain for use. *Dose.* A teacupful or more two or three times a day.

AGUE. *Syn.* INTERMITTENT FEVER. A species of fever which comes on only at stated intervals, (hence called intermittent,) leaving the patient between the periods of attack, in apparently good health. The attacks of this disease usually return with great regularity, and have in consequence been distinguished by names having reference to the periods of their visits. From this characteristic nosologists have divided them into the

Quotidian, returning after a lapse of	24	hours.
Tertian	48	do.
Quartan	72	do.

and so on until the interval extends to nine or ten days, as in the nonanus and decimanus.

Symp. I. The *cold stage*, marked by debility, paleness, coldness, drowsiness, and general rigors throughout the body, impaired respiration, nausea, vomiting, &c. These symptoms gradually abate, and are followed by—II. The *hot stage*, distinguished by the usual marks of fever, and, in some cases, violent delirium, &c. After a certain time the disease passes into—III. The *sweating stage*, marked by a copious perspiration breaking out, and a gradual return of most of the functions of the body to their ordinary state. In many cases, however, not only do the symptoms, but the succession of the stages and their duration also vary.

Causes. Exposure to the miasmata of marshes and stagnant water, putrefying animal and vegetable matter, &c., poor diet, exposure to cold and damps, damp bed-chamber or linen; excessive grief, fatigue, &c.

Remedial measures. I. *Palliative.* An emetic or a full dose of opium or laudanum has been recommended at the commencement of the fit, followed by a warm foot, hip, or full bath. Stimulants, as ether, spirits, &c., are also used, but when they fail to *relieve* they tend to aggravate the distemper. When any given method succeeds it should be again had recourse to on the approach of another fit.

II. *Curative.* This consists in the administration of febrifuge medicine during the intermission of the paroxysm. The principal of these are *bark and it* *preparations* and *liquor of arsenic.* The stomac and bowels having been well cleaned out, by th administration of two or three doses of purgativ medicine, 2 to 5 grs. of the disulphate of quinin may be given three or four times daily; or whe this cannot be obtained, 1 to 2 dr. of powdere cinchona bark may be used instead. When th stomach cannot bear the powder, the infusio decoction, or extract may be employed. Quinine properly administered, generally cures ague. Th solution of arsenite of potassa (liquor arsenicali P. L.) is also a valuable medicine in ague, but it use requires great care and attention. Under th name of "tasteless ague drop," it has cured thou sands. The dose should be at first five drops twic a day, gradually raised to 20 drops. This is th common ague medicine of the fen counties of England. In a certain book of travels through England it is said to be "a common practice for th farmers in the marshy parts of Essex to fetc their wives from the uplands, who seldom live lon in the low countries; so that most of the farmer there have had several wives, and many mak much money by this system of wifeing." Doe this mortality arise from the ague or the agu remedy? It may be further remarked, that warn clothing, and a light nutritious diet should be adopted during the curative course, and if the patien reside in a swampy or marshy district, he shoul remove as quickly as possible to one of a drier an opposite description.

AUGUSTINE. *Syn.* AUGUSTINA. Tromsdor gave this name to a substance found by him in th Saxon beryl, which he conceived to be a base capable of neutralizing the acids. Vauquelin ha since shown it to be a phosphate of lime, (whicl see.)

ALABASTER. A white calcareous or gypseous kind of soft stone, used by sculptors, and fo casting. The variety employed for the latter purpose is that most generally known, and when burnt forms the substance called *plaster of Paris.*

ALABASTER, OR PLASTER, TO BRONZE. I. Prepare the surface by sizing i over once or twice, and when dry touch the prominent parts of the figure with the bronze No. 1, an the remainder with No. 2. Then soften down th lines of mixture of the two paints with a badger' hair tool.

Bronze 1. Grind equal parts of Dutch meta and the following paint together, and thin the mixture with a little oil or turpentine.

Bronze 2. Grind Prussian blue, verdigris, an ochre separately with oil, then mix them togethe in such proportions as will produce a bronze gree color.

II. Touch over the prominent parts of the figure with Bessimer's gold paint, or instead thereof use gold or Dutch leaf, then cover the remainde of the figure as before, with the paint No. 2.

Remarks. When the lights are managed wit taste, especially on the prominent parts of the features in a statue, it produces a grand effect. (See BRONZING.)

ALABASTER, TO CLEAN. *Proc.* Wash the article with warm soap and water, then rinse in clean water. If the surface is polished it must be finished by touching it over with shave-grass,

and afterwards with French chalk, or talc, as directed under the article on Polishing Alabaster. Grease spots may be removed with a little *clean* oil of turpentine.

ALABASTER, TO ETCH. *Proc.* Cover every part of the surface of the model or cast, except the portion to be etched, with a mixture of one part of white wax, dissolved in four parts of oil of turpentine, thickened with finely powdered white-lead. When this coating has set, immerse the article in pure water, and allow it to remain for from 20 to 50 hours, according to the effect intended to be produced. Then take it out, remove the superfluous water, wash off the varnish with oil of turpentine, and carefully brush the etched parts over with powdered gypsum.

ALABASTER, TO HARDEN. *Proc.* I. Mix up the plaster of Paris with a weak solution of gum Arabic, (1 oz. to 1 pint of water,) or, for common purposes, a weak solution of size. *Remarks.* This not only renders the plaster harder, but gives the surface a pleasing smoothness. (See also KEENE'S MARBLE CEMENT.)

II. Expose the pieces in a baker's oven for 24 hours or longer, according to their thickness, then withdraw them, and when cool, dip them twice into pure river water, letting them remain immersed each time from 2 to 5 minutes; lastly, expose them to the air for 3 or 4 days before polishing. (M. Tissot.) *Remarks.* This plan is followed for pieces of statuary, &c. worked out of the solid gypsum. It is not adapted *so well* to plaster casts.

ALABASTER, TO JOIN. Ornaments of alabaster or plaster may be joined together by means of a little white of egg, thickened with finely-powdered quicklime, or by a mixture of newly-baked and finely-powdered plaster of Paris, mixed up with the least possible quantity of water.

ALABASTER, TO POLISH. *Proc.* I. The object, received in the rough state from the hands of the sculptor or turner, is rubbed with finely-powdered pumice-stone, or dried shave-grass (equisetum) and water, and afterwards with a paste formed of finely-powdered and sifted slaked lime and water. The rough polish thus produced is then brought up and finished off by friction with finely-powdered talc, or French chalk, until a satiny lustre is produced.

II. Dip the cast or model, previously warmed, and suspended by a fine silken cord or wire, into the purest white wax, melted in any suitable vessel. The operation should be repeated until the liquid wax begins to rest unabsorbed on the surface of the plaster, when the article must be placed aside (suspended) until the next day, when it may be polished with a *clean* brush. *Remarks.* None but the hardest, purest, and whitest wax will do for the above purpose. That commonly sold is mixed with spermaceti, stearine, or tallow, and not unfrequently with potato starch.

III. Suspend the article, well cleaned from dust, by means of a silk cord or wire, in a wooden trough or other suitably-shaped vessel, of glass or earthenware; then cover it with a strong and perfectly clear solution of alum. Let it remain until a sufficient quantity of the salt has crystallized on the surface, when it should be withdrawn and polished with a wet cloth. *Remarks.* I have seen beautiful imitations of marble produced in this manner, but the process requires great care and address.

ALABASTER, TO STAIN OR COLOR. *Proc.* I. Mix various colored powders or solutions with the plaster, at the time of mixing it up with water. *Remarks.* A little terra de Sienna, in very fine powder, or ground with water, added to the water employed to mix up the plaster, imparts a pleasing color to busts, statues, medallions, &c.

II. Objects formed from the solid alabaster may be stained in the same way, and with the same materials as marble. (See MARBLE.)

ALAQUECA STYPTIC. A stone used by the Indians to stop local bleeding. It is iron pyrites.

ALBUM RHASIS. An ointment composed of white-lead and lard, invented by and named after the Arabian physician Rhazes.

ALBUMEN. *Syn.* ALBUMEN (*Lat.*) The white of egg and the serum of the blood contain this substance in a sufficiently pure state for all the purposes of the arts. *Prop.* The acids, metallic salts, alcohol, and heat, coagulate albumen; hence it is incompatible with solutions containing them. Strong oil of vitriol turns it black in the cold, but on applying a gentle heat, a gorgeous red-colored solution is produced. (Dr. Hope.) Strong muriatic acid gives it a violet tinge. *Uses.* As a glaze, or species of varnish, and as a clarifier for wines, sirups, &c.

ALBUMEN, PURE OR SOLID. *Prep.* Agitate the white of egg with 10 or 12 times its weight of alcohol, and collect the precipitated flocculi on a muslin filter. *Prop.* Insoluble in pure water, unless it be heated to 150° C. or 302° F. (Wohler and Vogel.)

ALBUMEN POWDER. *Syn.* FLAKE ALBUMEN. SOLUBLE SOLID ALBUMEN. *Prep.* Expose the strained white of egg, in a thin stratum, to a current of dry air, until it concretes into a solid transparent substance, resembling horn. In this state it may be kept any length of time, or it may be further dried until brittle, and then powdered.

II. Substitute the serum of bullock's blood for the white of egg in the last formula.

Prop., &c. Soluble in cold water, forming a solution possessing all the properties of fresh albumen. *Use.* As a clarifier; exported in quantity to the sugar plantations of the West Indies. It is prepared for use by stirring it with cold water until it is dissolved, when it is whisked to a froth in the usual way, before adding it to the liquid to be clarified.

ALBUMEN, TESTS FOR. I. A solution of bichloride of mercury dropped into a fluid containing albumen, occasions a white precipitate. *Sensibility.* $\frac{1}{2000}$. (Bostock.)

II. Tannin or tincture of galls gives a yellow, pitchy precipitate.

ALCAHEST. *Syn.* ALKAHEST. A word of uncertain meaning, frequently applied by the alchemists to liquids which they thought to possess great solvent powers.

ALCAHEST OF GLAUBER. *Syn.* ALCAHEST GLAUBERI. Obtained by detonating nitre on hot coals, and then exposing it in a damp place until it runs into an oily-looking fluid. It thus becomes oil of tartar.

ALCAHEST RESPURII. Obtained by de-

tonating a mixture of nitre and zinc filings, powdering the resulting scoriæ, agitating it with water, and filtering. The filtered liquor contains the alcahest.

ALCAHEST ZWELFERI. Acetic acid obtained by the dry distillation of verdigris.

ALCARRAZAS. A species of porous pottery, made in Spain, for the purpose of cooling water, by its transudation and copious evaporation from the sides of the vessel. Vessels made in either of the following ways possess similar properties.

Prep. I. Well mix, in the dry state, equal parts of silicious sand and good clay, then bring it to a proper consistence with brine, adding afterwards a considerable quantity of common salt, which must be well incorporated with the clay by beating. The vessels formed of this mixture must be only half baked.

II. Mix up your clay with twice its weight of charcoal, in powder, and bake it until the latter substance is perfectly burnt out.

ALCOHOL. *Syn.* Alkohol. Alkahol. Alcahol. Höchst Rectifizirter Weingeist (*Ger.*) Alcohol (*Fr.*) Alcoole (*Ital.*) Alchool. Alcool. Alcol. Alkol (*obs.*) From the Arabic *al* the, and *kohol* antimony. A term originally applied to several chemical preparations, presumed to be very subtile, or brought to the highest state of tenuity, but at the present day restricted to pure spirit of wine, of the strongest class.

Hist. Fermented liquors were known to antiquity. "Noah planted a vineyard; and he drank of the wine, and was drunken;" an event supposed to have happened 2348 years before the birth of Christ. Wine and fermented liquors are also mentioned by the earlier profane historians; but the period at which they were first submitted to distillation is undecided. By some, the Chinese are thought to have possessed the earliest knowledge of this process; others think that the northern nations of Europe were the first who were acquainted with the art of distillation. Herodotus, however, mentions date spirit as an article of commerce in Babylonia (B. C. 445.) Albucacis, in the 12th century, taught the method of procuring spirit from wine; but the process was doubtless known long before that time. Raymond Lully, in the 13th century, showed the way to concentrate it, by means of carbonate of potassa; after which time it gradually rose into note as an article of trade and commerce. At the present day, more capital is, perhaps, embarked in the various processes of distillation than in any similar branch of business.

Sources. Alcohol is a product of the fermentation of vegetable juices or solutions containing saccharine matter, or some substance (as starch) capable of conversion into sugar. In this state, it forms but a small portion of the fermented liquor, (as in wine, beer, brewer's wash, &c.,) and is obtained in an isolated form by the process of distillation. It is a component part of nearly all intoxicating beverages, and gives them their peculiar properties. Brandy, gin, and rum contain about half their bulk of alcohol. Dilute alcohol may be procured, by the ordinary process of distillation, from *all* fermented liquors; when drawn from wine, (as in France,) it constitutes *brandy*; when from the juice of the sugar-cane, it is called *rum*; and when from malt, grain, or molasses, (as in England,) it is called *malt*, *grain*, or *molasses spirit*. The following table of the sources of spirit will no doubt prove interesting to the reader:

Table of the Sources of the various Spirits of Commerce, by Dr. A. T. Thompson.

Names.	Materials from which they are distilled.	Countries producing them.
Agua ardiente	Pulque, the fermented juice of the agave	Mexico.
Arrack	Coarse palm sugar, named jaggery, fermented with the bark of the mimosa *leucophlea*; also from rice and the fermented juice of the palm	India
Var. Mahwah Arrack	Flowers of the Madhuca tree, bassia *butyracea*	India.
Tuba	Palm wine	Philippine Islands.
Araka	Koumis, fermented mare's milk	Tartary.
Araki	Dates	Egypt.
Arika	Fermented cow's milk, a variety of koumis	Tartary, Iceland.
Brandy	Wine, figs, peaches, Persimmon apple, mulberries, and sometimes other fruits	Europe, Asia, N. and S. America; wherever wine is made.
Var. Lau	Rice	Siam.
Rakia	Husks of grapes, mixed with aromatics	Dalmatia.
Rossolio	A compound of brandy, ros-solis, and other plants	Dantzic.
Troster	Husks of grapes, fermented with barley and rye	On the Rhine.
Sekis-kayavodka	Lees of wine and fruit	Scio.
Geneva. Hollands	Malted barley and rye, rectified on juniper berries	Holland.
Var. Gin	Malted barley, rye, potatoes, rectified with turpentine	England.
Goldwasser	Wheat, barley, and rye, rectified with aniseeds, cinnamon, and other spices	Dantzic.
Kirchwasser	Machaleb cherry	Switzerland.
Maraschino	Macarska cherry	Zara, capital of Dalmatia.
Rum	Cane sugar and molasses	West Indies and South America.
Ditto	Maple sugar	North America.
Var. Slatkaia trava	A sweet grass	Kamschatka.
Show-choo	The lees of mandarin, a wine made from boiled rice	China.
Whiskey	Malted and raw barley, rye, oats, and potatoes	Scotland and Ireland.
Ditto	Sloes	South of France.
Y-wer a	The root of the tee-root, baked, pounded, and fermented	Sandwich Islands.
Vino meresel	Distilled from pulque, the fermented juice of the agave *americana*	Mexico.

Remarks. All the different varieties of spirit mentioned in the preceding table, consist of dilute alcohol, holding in solution various quantities of essential oils and coloring matter, and frequently a little ether and extractive. It is the presence and different proportions of these ingredients which give them their distinguishing characters. By subsequent rectification, alcohol of equal purity and strength may be procured from all of them. In the present article, I shall confine myself to a notice of the preparation of pure spirit, or alcohol of the chemist, referring the reader to the heads DISTILLATION, SPIRIT, STILL, RUM, BRANDY, GIN, WHISKEY, &c. for further information.

Prep. I. (*Alcohol of the L. Ph.*) Rectified spirit (sp. gr. 0·838) 1 gallon; chloride of calcium (dried) lb. j. *Proc.* Dissolve the chloride in the spirit, and let 7 pints and 5 fluid ounces distil over. *Remarks.* The sp. gr. of this spirit is 0·815, and as it contains about 7% of water, it would be more appropriately called highly rectified spirit. The process of the Dublin College is of a similar description, except that in addition to the chloride of calcium, 3½ lbs. of dried pearl-ashes (still hot) are used, and the distillation continued until the residuum begins to thicken. Alcohol of the D. P. has the sp. gr. 0·810.

II. (*Alcohol of the E. Ph.*) Rectified spirit, 1 pint; lime, 18 oz. *Proc.* Break the lime into small fragments, pour on the spirit, and heat the mixture gently in a glass matrass (closed) until the lime begins to slake, then withdraw the heat, and preserve the upper part of the vessel cool with damp cloths, until the slaking has finished; next attach a proper refrigeratory, and carefully distil off 17 fluid ounces. *Remarks.* The sp. gr. of the product should be 0·796, in which case it would be very nearly free from water. Should the density exceed ·796, the College states that the distillation must have been begun before the slaking of the lime was finished.

III. (*Absolute Alcohol.*) *a.* Saturate alcohol of 90%, or sp. gr. 0·835 to 0·840, with dried chloride of calcium in powder, and then draw it over in a water bath, with a gentle heat. (Liebig.)

b. Place alcohol of 90% under the exhausted receiver of an air-pump, near a vessel containing quicklime. After the lapse of 3 or 4 days, if the vacuum be well kept up, the spirit will have entirely lost its water. (Graham.) *Remarks.* The best means of operating is to use two shallow circular vessels, of different sizes, and to place the one containing the spirit in the other holding the lime, care being taken to prevent the latter falling over the side of the small vessel into the spirit, as it swells.

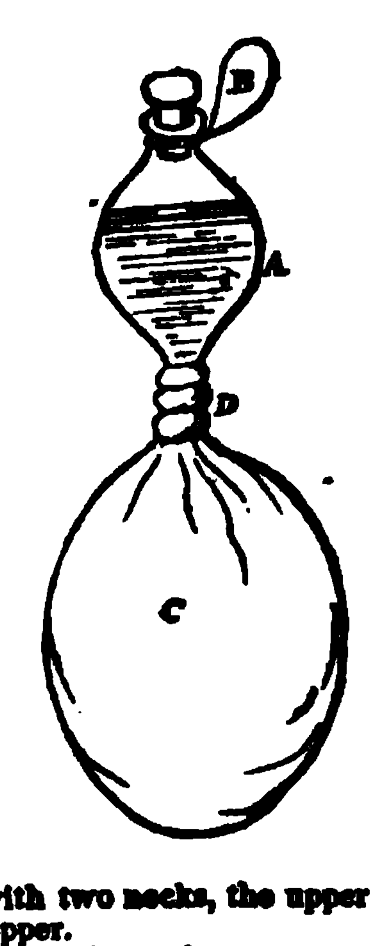
IV. (*Varnish-maker's Alcohol.*) Take the bladder of an ox or calf, soak it for some time in water, then inflate it and carefully free it from the attached fat and vessels; this must be done on both sides. After it is again inflated and dried, smear over the outer surface *twice*, and the inner surface *four* times, with a solution of isinglass. Then nearly fill it with the spirit to be concentrated, leaving only a small space vacant; it is then to be securely fastened, and suspended in a warm situation, at a temperature of about 122° Fahr., over a sand bath, or in the neighborhood of an oven or fire. In six to twelve hours, if the heat be properly conducted, the spirit will be concentrated, and in a little time longer may be rendered nearly free from water (anhydrous) or of the strength of 97 or 98 per cent. (Soëmmering.)

Remarks. This alcohol will be sufficiently pure for all the common purposes of the manufactures, and is an excellent spirit for making varnishes, &c.

The same bladder will serve more than one hundred times; and in fact a *common* bladder, thoroughly cleansed from fat, and washed and dried, may be used without any further preparation. The bladder should be kept full, or else a portion of the spirit will escape through the empty part. To prevent this accident, I have adopted a bottle with a double neck, of the shape of *A*, (see engraving,) by which means I am always able, not only to keep the bladder full, but to empty it and to refill it without any trouble. After the first or second time of using the bladder, I find it gives alcohol sufficiently pure for most experimental purposes. Before hanging the apparatus up, it is better to enclose it in a coarse potato netting, and to suspend it by means of the latter, which will prevent any accident arising from the strain on the neck of the bladder. Should weaker spirit than that directed in the preceding formula be used, to procure alcohol by either method, it must be previously concentrated, or the operation repeated a second time.

Prop. Light, transparent, colorless, volatile, inflammable; mixes in all proportions with water; dissolves resins, essential oils, camphor, bitumen, soaps, sugar, the alkaloids, wax, spermaceti, and various other substances. Boils at 172°; curdles milk; coagulates albumen, and separates both starch and gum from their mucilages; uncongealable by cold; powerfully antiseptic to animal or vegetable substances immersed in it; with acids it forms ethers.

Use. It is used to dissolve resins by the varnish maker; essential oils, by the perfumer; and by the pharmaceutist, to prepare tinctures and many



A, A bottle with two necks, the upper furnished with a ground-glass stopper.
B, Loop of cord to hang the apparatus up by.
C, Bladder containing spirit, filled by means of the bottle *A*.
D, Neck of bladder accurately secured to the under neck of the bottle *A*.

other valuable medicines. It is used to fill the tubes of thermometers required to register extreme degrees of cold; it is frequently burnt in lamps; and, where it is inexpensive, it is used for the manufacture of vinegar. It is employed in medicine, and as a beverage, in a diluted state, (brandy, gin, &c.;) but it is powerfully poisonous when undiluted with water. *Largely diluted* with water, it has been given as a tonic and stimulant, in some cases of colic, &c.; but for this purpose, it is not equal to good brandy or malt spirit, while it is far less agreeable. The properties and uses of the various articles into the composition of which alcohol enters, will be described under their respective heads.

Pur. The presence of water is best known by its specific gravity, (see ALCOHOLOMETRY,) and the absence of other foreign matter, by the following tests:—The London College states, in the notes to the Pharmacopœia, that it should be "colorless; evaporate entirely by heat; combine with water and with ether, retaining its transparency; taste and smell vinous." It should be neutral to test paper. Absolute alcohol has a sp. gr. of 0·792-0·791 at 68° Fahr., and 0·7947 at 60° Fahr.

Tests. I. Add colorless oil of vitriol to the spirit; a red tinge will be produced if essential oil be present. (Liebig.) II. A solution of nitrate of silver added to pure alcohol, does not alter its color or transparency. If it turns *red*, it contains oil or other organic matter. (Vogel.) *Remarks.* This test is very delicate, and is equally applicable to dilute as strong alcohol.

ALCOHOL DE BRUCINE. *Syn.* TINCTURE OF BRUCIA (*Majendie.*) *Prep.* Brucine, 15 grs.; rectified spirit of wine, f ℥j; dissolve. *Remarks.* The action of brucine is similar to strychnine, but in a milder degree. This tincture is given in doses of 5 to 25 drops in paralysis, (without fever,) in dyspepsia, pyrosis, impotence, and various other cases, where strychnine has been prescribed. It is an *active poison.*

ALCOHOL DE CINCHONINE. *Syn.* TINCTURE OF CINCHONINE. ALCOOL DE CINCHONINE. (*Majendie.*) *Prep.* Sulphate of cinchonine, 8 grs.; rectified spirit, f ℥j; dissolve *Dose.* 15 to 50 drops as a febrifuge, (in intermittents.)

ALCOHOL DE QUININE. *Syn.* ALCOOL DE QUININE. TINCTURE OF QUININE. (*Majendie.*) *Prep.* Dissolve 6 grs. of sulphate of quinine in f ℥j of rectified spirit. *Dose, &c.* As the last. This tincture is principally used to prepare the wine of quinine.

ALCOHOL DE STRYCHNINE. *Syn.* TINCTURE OF STRYCHNINE. (*Majendie.*) *Prep.* Strychnine, 3 grs.; rectified spirit, f ℥iss; dissolve. *Uses, Doses, &c.* This tincture is given in paralysis, impotence, &c., in doses of 5 to 20 drops. It is a *violent poison.* (See STRYCHNINE.)

ALCOHOL DE VERATRINE. *Syn.* TINCTURE OF VERATRIA. I. (*Majendie.*) Veratria, 4 grs.; rectified spirit, f ℥j; dissolve. *Dose.* 10 to 25 drops.

II. (*Turnbull.*) For external use. Veratria, ʒj; rectified spirit, f ℥ij: dissolve.

Remarks. The first is given instead of colchicum, in gout, rheumatism, &c.; the second has been employed externally in neuralgia, as well as in gout and rheumatism, as a substitute for the ointment

ALCOHOLATES. Salts, in which alcohol appears to replace the water of crystallization. *Prep.* Some of them may be formed by simple solution and crystallization in alcohol. (Graham.)

ALCOHOLOMETER. An hydrometer or instrument for ascertaining the quantity of alcohol in any given mixture of spirit and water.

ALCOHOLOMETRY. The process or method of determining the strength of spirits.

General Remarks on the nature of Alcoholometry, and the Excise Regulations of Great Britain.—The great importance of being able *accurately* to determine the strength of spirits, in the United Kingdom, on account of the high duties levied thereon, has induced the government authorities, at various times, to fully investigate the subject. Towards the end of the last century, Sir C. Blagden instituted a series of very minute and accurate experiments to determine the real specific gravity of different mixtures of alcohol and water. The results of this investigation were published in the Phil. Trans. for 1790, and have formed the data from which the government have since made their calculations for the purposes of the Excise and Customs. More recently the Lords of her Majesty's Treasury requested the Royal Society to examine into the accuracy of these tables, and the construction and application of the instrument (Sike's hydrometer) now used by the revenue officers, and based thereon. The Committee of the Royal Society reported favorably of the accuracy of the numbers contained in Gilpin's Tables, employed by the government, which they declared far surpassed, in this particular, what could reasonably be expected, and that they were sufficiently perfect for all practical and scientific purposes. The experiments went to show, that the error introduced into calculations respecting the strength of spirits, by these tables, was quite unimportant in practice, and did not, in any one instance, amount to *unity in the fourth place of decimals.* This method, which I shall presently describe, adopts the sp. gr. as a test of the strength in alcohol, and is founded on the fact that the latter fluid is considerably lighter than water, and that (with proper corrections for condensation) the sp. gr. *regularly* increases or decreases, according to the relative proportions in which the two are mixed.

Several other methods of alcoholometry have been proposed, founded upon the temperature of the vapor; the heat evolved by the admixture with water; the insolubility of the carbonate of potassa in alcohol; the volatility of alcohol, &c. &c.; some of which I shall notice farther on. *The method adapted by the Excise and Customs* should be that employed in trade and commerce in England, not only on account of its superior simplicity and correctness, but for the purpose of *exactly coinciding with the survey of these authorities.*

The duties on spirits are charged on the number of *proof gallons* they contain, which is ascertained by first "*gauging*" or "*ullaging*" the liquor, and then taking its specific gravity, by Sike's hydrometer, the number indicated by which, on reference to the tables, gives the per centage of spirit it may contain *over* proof, or its deficiency per cent. *under* proof; and the real content per centage of proof, multiplied by the "gauge" or

"ullage," gives the net amount of proof spirit in the quantity surveyed.

The proof strength is an arbitrary standard, adopted for the purpose of facilitating calculations, for which it is well suited. The sp. gr. of proof spirit, as defined by Act of Parliament, is ·920 at 60° F., and contains, in 100 parts, by weight, 49 parts of alcohol of ·791, and 51 parts of water. At 51° F., 13 volumes of proof spirit weigh exactly equal to 12 volumes of distilled water. It is of great advantage to the spirit-dealer to be acquainted with the method of estimating the correct number of proof gallons in any sample or quantity of his commodities; and I have known many disagreeable errors result from ignorance on this point. Calculations of this kind are very simple and straightforward. Thus, when we find by the hydrometer that a given sample of spirits is 10 overproof, or "*o. p.*" as it is technically called, it means that 10 gallons of water added to 100 gallons of such a spirit, would produce 110 gallons of proof spirit; or, in other words, that 100 gallons of such a spirit contain exactly as much alcohol as is contained in 110 gallons of proof. In *overproof* spirit, the per centage overproof always represents the *quantity of water* it will take to reduce it to *proof*. By adding its per centage overproof to 100, we obtain a number, which, multiplied by any number of gallons, and divided by 100, will give the exact number of proof gallons which is contained in the given quantity of spirit of that strength. For example, I have a puncheon of rum, holding 91 gallons of spirit, which I find to be 21 *o.* p. How many proof gallons does it contain?

Per centage overproof 21, added to 100, equal to	121
Number of gallons	91
Divide by 100		11011
No. of gallons of proof spirit .	110·11

(To divide by 100, is only to point off the last two figures.) To ascertain how much water I must add to reduce it to the proof strength, I have only to deduct the number of gallons of 21 o. p. from its content in proof; in the above case this would be—

No. of proof gallons . . .	110·11
No. of gallons of the o. p. spirit .	91
Gallons of water to be added .	19·11

Or as nearly as possible 19 gallons and 1 pint. When we say a spirit is 11 u. p. or underproof, we mean that 100 gallons of such spirit contains 11 gallons of water and 89 gallons of proof spirit; and so of other strengths. By deducting the per centage underproof from 100, we not only obtain the number of proof gallons contained in 100 gallons of such a spirit, but as in the last case a factor which multiplied by any number of gallons, and divided by 100, gives the exact number of proof gallons contained in such a quantity of the given strength. Thus, I have an ullage brandy piece, containing 45 gallons of spirit, which I find by the hydrometer to be 10 u. p. How many gallons of proof does it contain?

Deduct 10 from 100, and we have	90
Multiply it by the No. of gallons	45
Divide by 100		4050
Quantity of proof spirit	40·50

Or exactly 40½ gallons.

On the same plan we may ascertain how much water it will take to reduce one strength to another, of any weaker degree. Thus, I have a puncheon of rum, as before, containing 91 gallons of spirit 21 o. p., which I wish to reduce with water to 10 u. p. I have already found that this quantity contains a little more than 110 proof gallons; I have therefore only to reckon how many gallons of spirit 10 u. p. it would take to contain an equal quantity of that strength. I find this by the simple rule of proportion. I know that 100 gallons are only equal to 90 of proof; therefore, if 90 are equal to 100, how many are equal to 110, which I find to be as nearly as possible 122¼ gallons. I have then only to deduct the number of gallons of 21 o. p. from 122¼ gallons to find the quantity of water I must add to make 122¼ gallons of spirit 10 u. p. By a little practice such calculations become excessively easy. In all these cases a knowledge of the four first rules of decimal fractions is advantageous, as the Excise calculate their proof to two figures of decimals or $\frac{1}{100}$ths. Their plan is to reject the *third* figure when less than 5, but to carry 1 to the preceding if it exceeds it; thus, 5·432 would be put down as only 5·43; but 5·437 would be written 5·44.

Formerly, spirit was said to be 1 *to* 3, 1 *to* 4, &c., overproof, by which it was meant that 1 gallon of water added to 3 or 4 gallons of such spirit would reduce it to proof. On the contrary, 1 *in* 3 or 1 *in* 4 underproof meant that the 3 or 4 gallons, as the case may be, contained 1 gallon of water and the remaining quantity of proof spirit. This method of calculation has now, however, given way to the centesimal system, which not only admits of greater accuracy, but is quite as simple, and should be adopted by every spirit-dealer in England, from being the plan followed by the Excise, with whose estimate it is absolutely necessary they should agree.

The stocks of "dealers" (who are not permitted to sell less than 2 gallons) are always taken by the proof; but the spirits sold by the retailers are only tested on being admitted into stock, and then afterwards taken according to their gross quantity, (ullage or gauge.) The Excise can, however, try the strength of any sample they choose, even in the stock of a *retailer*, when, if it be altered from the strength at which it was "*permitted*" into stock more than 3⅝, or if it be otherwise of an illegal strength, it becomes *seizable*. A surplus, however small, of more than 2 gallons over the quantity that should remain in hand of any one "*quality*" of spirit, after deducting the amount sent out by permits from the last stock, is also seizable; and even if an increase frequently occurs, though it be "*less than two gallons*," it immediately attracts the notice of the Excise, and frequently leads to *inquiries* and inconvenience to the dealer.

By the Revenue Laws of Great Britain, spirit of greater strength than 43 o. p., or sp. gr. 0·8597, is designated spirit of wine, and marked S. W. by

ACROLEINE. When fixed oils are exposed to a heat sufficient to produce ebullition, acroleine, mixed with carbureted hydrogen, is given off. By passing the vapor through a series of well-cooled bottles, partly filled with water; and by redistilling the contents of the second and third bottles, this substance will be obtained in the form of an oily liquid, possessing a very disagreeable odor. It has never been obtained in an isolated state, and little is known concerning its precise composition.

ADIPIC ACID. One of a series of new acids discovered by Laurent, among the products of the oxidation of oleic acid, by means of pure colorless nitric acid.

Prep. Gently evaporate the mother liquor, left from the process of preparing pimelic acid, set it aside for some days, and then collect the crystals deposited; repeat this operation until the liquor ceases to yield crystals. Then dissolve them in hot water, skim off the oil, filter, evaporate, and crystallize. Dissolve in ether, and evaporate to one half; collect the crystals and repeat the process a second time; next dissolve the two crops of crystals separately in alcohol, when adipic acid, in roundish crystalline grains, and dipic acid, in plates, will be obtained.

Prop. Color brown, soluble in hot water, volatile above 266°. It unites with the bases, forming salts called adipates, which are mostly soluble.

ADIPOCERE. *Syn.* Adipocera. (Adeps *Fat*, and Cera *Wax*.) Grave Wax. *Hist.* On the removal of the bodies from the Cimetière des Innocens in Paris, in 1786, it was found that they were for the most part converted into a substance resembling spermaceti, to which the name of adipocere was given. Fourcroy was the first who submitted this substance to a scientific examination, though it is said to have been previously known to grave-diggers, and that it is even mentioned by Lord Bacon.

App. It was proposed by Lavoisier to produce this substance artificially, for the purposes of the arts. Dr. Gibbs of Oxford found that lean beef, suspended in running water, was converted into fat (adipocere) at the end of a mouth. Three pieces of lean mutton were immersed in each of the three mineral acids, in separate vessels. At the end of three days, that in the nitric acid had changed into a soft fatty matter; that in the muriatic was less altered; while that immersed in the sulphuric had become black and carbonized. Attempts have been made to convert the dead bodies of cattle (carrion) into adipocere, for the purposes of the candlemaker and the soap-boiler, but without success. From the experiments of Von Harkhol, extending over a period of 25 years, it appears that the carcasses of mammalia, immersed in running water, are after a lapse of three years converted into a pure, hard, scentless fat, resembling white wax, perfectly fit for the manufacture of soap and candles. Exposure to stagnant water gives more fat, but of an impurer kind. For further information on this subject, the reader is referred to 'Ure's Chemical Dictionary,' and to the 'Dictionary of Arts, Manufactures, and Mines,' by the same author.

ADULTERATION. The fraudulent corruption of pure articles, by admixture with others of less value, for the sake of greater gain. The means of detecting the adulterations generally met with in trade, will be found explained, under each article of importance, in its alphabetical order.

ÆGIRINON. A once popular ointment, made by macerating the fruit of the poplar, in six times its weight of melted lard, and straining. It is much employed in some parts of the Continent.

ÆSCULINE. A new alkaline substance, said to have been found in the horse-chestnut. It is probably extractive matter combined with lime.

ÆTHIOPS. *Syn.* Ethiops. A name give by the older chemists to several black powders on account of their color. (See the following articles.)

ÆTHIOPS, ANIMAL. This was a powder obtained by burning various animals, as the hedgehog, mole, sparrow, &c., to a cinder.

ÆTHIOPS, ANTIMONIAL. *Syn.* Ethiops of Antimony. Æthiops antimonialis. *Prep.* Sulphuret of antimony, two parts; quicksilver, one part. *Proc.* Triturate until the globules are extinguished. *Dose.* 3 to 5 grs., gradually raised to a scruple, in some cutaneous diseases.

ÆTHIOPS, GOLDEN. *Syn.* Æthiops auripigmentum. This æthiops is made by triturating together the red sulphuret of arsenic and metallic mercury. It is poisonous, and is never employed in medicine at the present day.

ÆTHIOPS, JOVIALIS. Prepared by rubbing together equal parts of tin, quicksilver, and sulphur. It was once given in skin diseases.

ÆTHOGEN. A compound of nitrogen with boron, named from its combinations with the metals, producing a phosphorescent light, in the oxidating flame of the blow-pipe.

Prep. Mix seven parts of powdered anhydrous boracic acid, with nine parts of melon, place the mixture in a crucible lined with charcoal, and apply heat, then transfer the product into a well-stopped vial. (Balmain.)

Prop. A light powder, resembling magnesia, infusible, and nearly insoluble in water. It forms compounds with the metals, called æthonides. These may be prepared by either exposing a mixture of the metal and æthogen to heat, or a mixture of the cyanide of the metal with boracic acid

AGRICULTURE. (From *ager*, a field, and *colo*, I till.) The art or business of the farmer; the cultivation of the soil in large quantities, for the purpose of raising crops and live stock. In its more extended sense, it includes *road-making*, *embanking*, *draining*, *planting*, *&c*. It is one of the most important of the useful arts, and when combined with chemistry is not unworthy of the name of science. The following short sketch of the history and principles of agriculture is from the pen of J. C. Loudon, F. L. S., H. S., &c.

Hist. "*The origin of agriculture* may be traced to remote antiquity, and was doubtless coeval with that of fixed property. In the primeval state of society, the sole riches of the husbandman consisted of flocks and herds, which were kept in a state of movement from one point to another, in search of pasturage and water; but as population increased, mankind adopted a fixed abode; this could only be done by bestowing on the site a certain degree of labor and care, which became as it were the *price paid* for constituting it *private property*. At this point in the progress of civiliza-

tion, agriculture may be said to have commenced. Previously, the natural products of the soil were merely consumed where they were found, but *now* men sought to increase them by culture.

"*The culture of land* will be found to have depended in every country principally on its climate and civilization; though partly also on its government and population. In the warmer climates, where nature produces fruits in the greatest abundance, for the food of both men and animals, and where very little care is required to procure shelter or clothing, agriculture has made but little progress; because it is comparatively unnecessary for the prosperity of the inhabitants. In climates of a directly opposite character, agriculture has made equally slight progress, from the natural obstacles opposed to it. In such countries, for example, as Greenland and Kamschatka, only one or two kinds of corn crops can be cultivated, and perennial grasses can scarcely exist; because the ground is covered with snow for eight months of the year; and in these countries agriculture is but little practised, as the chief resources of the inhabitants for food are found in the sea and forest. In intermediate climates, such as those of South Britain, the middle of France, and the North of Italy, the soil may be labored by man throughout the whole year, and there is scarcely any limit to the kind of crops which may be raised on it. In such climates, agriculture is calculated to attain the highest degree of perfection; and comparing different parts of the zones of this description of climate in both hemispheres, perhaps it may be asserted, that *the best agriculture in the world is to be found in Britain and the North of Italy;* viz., in *East Lothian* and *Norfolk*, in the *Vale of Arno* and on *the banks of the Po.* The kind of agriculture practised in different countries is also of course adapted to the difference of climate. Thus, towards the North Pole, the great art of the cultivator would be to increase the heat; or, rather, in adopting such measures as would best guard plants and animals against cold, rains, and the vicissitudes of the weather. Towards the south, on the other hand, the art of the cultivator would be chiefly directed to moderating the extreme heat and supplying moisture. It thus appears that the agriculture of any country depends on its latitude; and that in high and low latitudes, where there are greater extremes of climate and temperature to contend with, agriculture must be of a more difficult and hazardous description than in intermediate or more temperate climates, such as that of Syria, where the art is supposed to have originated, or in Europe, where it may be considered as having attained its highest degree of perfection.

"In tracing the progress of this art in civilized countries, we have only to follow the chronology of general history. As the Greeks and Romans appear to have arrived at as great a degree of perfection in legislation as the moderns, so they appear to have attained nearly equal excellence in the practice of agriculture. Till within the present century, very little difference existed between the most approved agriculture of climates analogous to that of Italy, and the agriculture of the Romans as described by Cato, Columella, and other ancient writers. The chief superiority of the moderns consists in their machinery, and in their knowledge of the *science* of the art; the last being of very recent date, and by no means general among practitioners, (farmers.) By science, improved breeds both of plants and animals have been originated, and by modern machinery a more perfect tillage has been produced, and also a more complete separation of the produce from the soil, from the refuse of the plants which bore it, and from all impurities.

"*The history of British agriculture* begins with the Roman Conquest. Julius Cæsar found the inhabitants in a state of semi-barbarism; but Agricola left them in possession of all the arts of civilization then known. Agriculture declined with the invasion of the Saxons; but was preserved through the dark ages after the establishment of Christianity by the intelligence of the religious establishments, who gradually became possessed of the greater portion of the landed property of the country. Agriculture revived in the reign of Henry VIII., and in that of Elizabeth, during the long peace which then prevailed, and the consequent security of property; and it afterwards declined during the civil wars; it again revived during the reigns of William and Mary, Queen Anne, and George I., in consequence of the introduction of the Flemish husbandry, which included the culture of turnips and clover. A still greater stimulus to the art was given during the reign of George III., by the introduction of ploughs drawn by *two* horses, instead of *four* or *six;* of the drill system, and its application to the culture of turnips and potatoes; and by the improvements made in the breeding and rearing live stock, by Bakewell and Culley. Early in the present century, the threshing-machine was an important addition to agricultural machinery; the reaping-machine, the frequent drain system, and the subsoil plough, are improvements just coming into use; and the next grand attempt will probably be the general application of steam, instead of horses and cattle, in tillage and other field operations.

"*The principles of agriculture* are derived from a knowledge of the nature of plants and animals, of soils and manures, and of the climate, the seasons, and the weather. Plants are organized beings, which take up their food by means of roots, from the interior of the soil;* animals are organized beings, which select their food from vegetables growing on the surface of the soil, or from other animals, and this food is prepared before being absorbed into their system, by means of a stomach. The climate of a country determines both the plants and the animals which can be produced in it; and the seasons and the weather, the times when the plants and animals of the given climates are in particular states of vigor or torpidity; and when certain operations of culture can be performed on them or on the soil.

"The nature of these elementary materials being understood, even though imperfectly, certain improvements can be effected in them by art, which are greatly conducive to the increase of agricultural produce. The kinds of plants and animals suitable to any given climate, soil, or season, are determined by the laws of nature; but from among these kinds it is in the power of man to

* And by means of their leaves from the atmosphere.—A. J. C.

Table exhibiting the relations between the Indications of Sike's Hydrometer and the real Specific Gravity. By Mr. Gutteridge.

Over Proof.	Specific Gravity at 60° F.	Under Proof.	Specific Gravity at 60° F.
70 per centum.	0.8095	(Proof)	0·9200
64 "	0·8221	5 per centum.	0·9250
63·1 "	0·8238	10 "	0·9318
62 "	0·8259	11 "	0·9329
61·1 "	0·8277	15·3 "	0·9376
60 "	0·8298	17·1 "	0·9396
59·1 "	0·8315	20 "	0·9426
58 "	0·8336	22·3 "	0·9448
57·1 "	0·8354	23·1 "	0·9456
56 "	0·8376	25·1 "	0·9476
55·9 "	0.8379	30·1 "	0·9522
55·7 "	0·8383	40·1 "	0·9603
55 "	0·8396	50·3 "	0·9673
54·1 "	0·8413	60·4 "	0·9734
50·1 "	0·8482	70·1 "	0·9790
43·1 "	0·8507	80·4 "	0·9854
25 "	0·8869	90·2 "	0·9922
11·1 "	0·9060	100 (water.)	1·0000

Other instruments of a similar nature to Sike's hydrometer (but less complicated) have been constructed, which at once give the per centage of alcohol in a given sample. Thus, the areometer of Gay Lussac, and the alcoholometer of Tralles, at once float to a figure on the stem, which indicates the per centage of alcohol, *by volume*, in the liquor in which they are placed; while the alcoholometer of Richter gives *at once* the per centage by *weight*.

II. *From the specific gravity to find the per centage of pure Alcohol, by volume. Proc.* The sp. gr. at 60°, having been ascertained by any of the usual methods, (see Specific Gravity,) must be sought for in the *second* column of the following table, against which will be found, in the *first* column, a number representing its per centage of alcohol of 0·7939.

Table exhibiting the per centage by volume of Alcohol, corresponding to any given Specific Gravity. By Tralles.

Alcohol in 100 Measures of Spirit.	Specific Gravity at 60° F.	Difference of Specific Gravity.	Alcohol in 100 Measures of Spirit.	Specific Gravity at 60° F.	Difference of Specific Gravity.	Alcohol in 100 Measures of Spirit.	Specific Gravity at 60° F.	Difference of Specific Gravity.
Pure water	9991	00	34	9596	13	68	8941	24
1	9976	15	35	9583	13	69	8917	24
2	9961	15	36	9570	13	70	8892	25
3	9947	14	37	9556	14	71	8867	25
4	9933	14	38	9541	15	72	8842	25
5	9919	14	39	9526	15	73	8817	25
6	9906	13	40	9510	16	74	8791	26
7	9893	13	41	9494	16	75	8765	26
8	9881	12	42	9478	16	76	8739	26
9	9869	12	43	9461	17	77	8712	27
10	9857	12	44	9444	17	78	8685	27
11	9845	12	45	9427	17	79	8658	27
12	9834	11	46	9409	18	80	8631	27
13	9823	11	47	9391	18	81	8603	28
14	9812	11	48	9373	18	82	8575	28
15	9802	10	49	9354	19	83	8547	28
16	9791	11	50	9335	19	84	8518	29
17	9781	10	51	9315	20	85	8488	30
18	9771	10	52	9295	20	86	8458	30
19	9761	10	53	9275	20	87	8428	30
20	9751	10	54	9254	21	88	8397	31
21	9741	10	55	9234	20	89	8365	32
22	9731	10	56	9213	21	90	8332	33
23	9720	11	57	9192	21	91	8299	33
24	9710	10	58	9170	22	92	8265	34
25	9700	10	59	9148	22	93	8230	35
26	9689	11	60	9126	22	94	8194	36
27	9679	10	61	9104	22	95	8157	37
28	9668	11	62	9082	22	96	8118	39
29	9657	11	63	9059	23	97	8077	41
30	9646	11	64	9036	23	98	8034	43
31	9634	12	65	9013	23	99	7988	46
32	9622	12	66	8989	24	Pure Alcohol	7939	49
33	9609	13	67	8965	24			

Use of the preceding Table. When the temperature of the spirit is 60° F., the first column of the table gives at *once* the per centage of alcohol by *measure; when the temperature is below* 60° an addition must be made of 1 measure per cent. for every 5 degrees of the thermometer; and when above 60° a like quantity must be deducted. This correction will amount to the fraction $\frac{1}{5}$ or the decimal ·2 for every single degree, and is very easily made. *If the specific gravity sought* cannot be found exactly in the table, the *difference* between it and the next greater specific gravity in the table must be taken, which will give the numerator of a fraction, having for its denominator the number found in the *third* column against the next greater number just employed. This fraction, added to the per centage of alcohol in the first column of the table against the said specific gravity, will give the true per centage sought. Thus: "if the specific gravity of a spirituous liquor is 9605, what is its alcoholic content?" Here 9605 is not in the table, but the

next greater number is 9609; I therefore deduct the former from the latter, and put the difference (4) as the numerator of the fraction, having for its denominator (13), the number in the column of differences against 9609; I then add the fraction $\frac{4}{13}$ so found to the per centage against 9609 in the first column, which gives $33\frac{4}{13}$ as the true per centage of alcohol in the given sample.

The per centage by weight may be found in an equally simple way: multiply the number of volumes per cent. by ·7939, (the specific gravity of pure alcohol,) and divide the product by the specific gravity of the sample, the quotient will give the number of pounds of alcohol in 100 lbs. of the given spirit. Thus: in spirit of 9609 I find there are 33 *volumes* of alcohol per cent., what is its per-centage by weight? Example:

Sp. gr. alcohol	7939
Volumes of alcohol per cent. in sample . . }	33
Sp. gr. of sample 9609		261987 *product.*
	27·28 } or 27¼ lbs. of alcohol per cent.

III. *From the specific gravity to ascertain the per centage of alcohol by weight.* When it may be inconvenient to perform the short calculation just explained, the per centage by weight may be ascertained by mere inspection of the following table.

TABLE by LOWITZ, showing the Acoholic Content, by WEIGHT, of Spirits of different Specific Gravities, from pure Alcohol to pure Water, at 60° and 68° F.

100 parts.		Specific Gravity.		100 parts.		Specific Gravity.		100 parts.		Specific Gravity.	
Alc.	Wat.	At 68°	At 60°	Alc.	Wat.	At 68°	At 60°	Alc.	Wat.	At 68°	At 60°
100	0	0·791	0·796	66	34	0·877	0·881	32	68	0·952	0·955
99	1	0·794	0·798	65	35	0·880	0·883	31	69	0·954	0·957
98	2	0·797	0·801	64	36	0·882	0·886	30	70	0·956	0·958
97	3	0·800	0·804	63	37	0·885	0·889	29	71	0·957	0·960
96	4	0·803	0·807	62	38	0·887	0·891	28	72	0·959	0·962
95	5	0·805	0·809	61	39	0·889	0·893	27	73	0·961	0·963
94	6	0·808	0·812	60	40	0·892	0·896	26	74	0·963	0·965
93	7	0·811	0·815*	59	41	0·894	0·898	25	75	0·965	0·967
92	8	0·813	0·817	58	42	0·896	0·900	24	76	0·966	0·968
91	9	0·816	0·820	57	43	0·899	0·902	23	77	0·968	0·970
90	10	0·818	0·822	56	44	0·901	0·904	22	78	0·970	0·972
89	11	0·821	0·825	55	45	0·903	0·906	21	79	0·971	0·973
88	12	0·823	0·827	54	46	0·905	0·908	20	80	0·973	0·974
87	13	0·826	0·830	53	47	0·907	0·910	19	81	0·974	0·975
86	14	0·828	0·832	52	48	0·909	0·912	18	82	0·976	0·977
85	15	0·831	0·835	51	49	0·912	0·915	17	83	0·977	0·978
84	16	0·834	0·838†	50	50	0·914	0·917	16	84	0·978	0·979
83	17	0·836	0·840	49	51	0·917	0·920‡	15	85	0·980	0·981
82	18	0·839	0·843	48	52	0·919	0·922	14	86	0·981	0·982
81	19	0·842	0·846	47	53	0·921	0·924	13	87	0·983	0·984
80	20	0·844	0·848	46	54	0·923	0·926	12	88	0·985	0·986
79	21	0·847	0·851	45	55	0·925	0·928	11	89	0·986	0·987
78	22	0·849	0·853	44	56	0·927	0·930	10	90	0·987	0·988
77	23	0·851	0·855	43	57	0·930	0·933	9	91	0·988	0·989
76	24	0·853	0·857	42	58	0·932	0·935	8	92	0·989	0·990
75	25	0·856	0·860	41	59	0·934	0·937	7	93	0·991	0·991
74	26	0·859	0·863	40	60	0·936	0·939	6	94	0·992	0·992
73	27	0·861	0·865	39	61	0·938	0·941	5	95	0·994	
72	28	0·863	0·867	38	62	0·940	0·943	4	96	0·995	
71	29	0·866	0·870	37	63	0·942	0·945	3	97	0·997	
70	30	0·868	0·872	36	64	0·944	0·947	2	98	0·998	
69	31	0·870	0·874	35	65	0·946	0·949	1	99	0·999	
68	32	0·872	0·878	34	66	0·948	0·951	0	100	1·000	
67	33	0·875	0·879	33	67	0·950	0·953				

Remarks. This table is exceedingly useful in chemical calculations, and in purchasing spirit of high strength, which is usually sold by weight.

IV. *From the temperature of the vapor to determine its alcoholic contents.* This method has been proposed by Gröning, and offers a ready means of approximating to the strength of the spirit passing over, at every part of the process of distillation, as well as the value of the wash left in the still. *Oper.* Thrust the bulb of a thermometer through a cork inserted in a tube fixed in the head of the still, or other vessel, and note the

* Alcohol of the Lond. and Dub. Ph. † Rectified spirit of the L. Ph. ‡ Proof spirit.

temperature of the vapor in which it is thus immersed. Against this number in the following table, will be found the alcoholic contents of the vapor, and in the next column that of the boiling liquid from which it has arisen.

TABLE, by GRÖNING, of the Alcoholic Content of the vapor from mixtures of alcohol and water, and also of the boiling liquid from which they have been disengaged.

Temperature of Vapor. Fahrenheit.	Alcoholic Content of Vapor by volume per cent.	Alcoholic Content of boiling liquid per cent.
170·0	93	92
171·8	92	90
172·0	91	85
172·8	91½	80
174·0	90	70
174·6	89	70
176·0	87	65
178·3	85	50
180·8	82	40
183·0	80	35
185·0	78	30
187·4	76	25
189·8	71	20
192·0	68	18
194·0	66	15
196·4	61	12
198·6	55	10
201·0	50	7
203·0	42	5
205·4	36	3
207·7	28	2
210·0	13	1
212·0	0	0

V. *To determine the alcoholic contents of wine, beer, &c.* *Proc. a.* Half fill a graduated tube with the liquor to be tried, and add thereto about 12§ or 15§ of solution of diacetate of lead, (see below,) then agitate the mixture until the color be nearly removed; powdered dry carbonate of potassa must be next added until it falls down undissolved, on shaking the liquid; after which, on allowing the tube to repose for a short time, the alcohol will be seen floating on the top of the aqueous portion in a well-marked stratum, and its quantity may be read off by means of the graduations on the tube.

The solution of lead. *Ing.* Powdered litharge, 2 oz.; sugar of lead, 3 oz.; water, 1 pint. *Proc.* Boil to one half in a glass or lead vessel, then put it into a bottle, and cork it close.

b. The same may be effected by agitating a little powdered litharge with the sample until it becomes discolored and limpid, when it may be saturated with carbonate of potassa as before.

c. Another good way to determine the quantity of alcohol contained in a given sample of wine, is to separate it from the non-volatile constituents by distillation. A very neat apparatus for experiments of this nature has been contrived by M. Gay Lussac; but any species of small still or retort may be employed for the purpose. You take three hundred parts of the liquor to be tried, measured in a graduated glass tube. The operation is equally adapted for wines, beer, gin, and all kinds of spirituous liquors. Having inserted the liquor into the still, you carefully and slowly distil over one hundred parts, or one third of the liquor in the still, making use of a graduated tube as the recipient, and stopping the operation when the distilled liquor reaches the hundredth degree. You then ascertain the alcoholic strength of the distilled liquor by means of the hydrometer, and dividing the result by three, you have at once the per centage of alcohol of the liquor submitted to examination. If, for example, the hundred parts of distilled liquor contain thirty parts of alcohol, the wine submitted to distillation contains ten per cent. of alcohol. But if, from want of attention, you distil over more than one hundred parts of the liquor, it will not do to divide the alcoholic strength of the product by three, to obtain the per centage of alcohol of the liquor submitted to distillation: you must employ as the divisor, the number which expresses the relation of the volume of the distilled product to the bulk of the wine. If, for example, you have one hundred and six parts of distilled liquor, containing (as ascertained by the hydrometer) thirty-three parts of alcohol, you divide three hundred by one hundred and six, which gives 2·83, and then divide thirty-three by 2·83, which gives 11·66. The last number expresses the per centage of alcohol of the liquor submitted to examination.

Remarks. It was at one time maintained by Fabroni and others, that alcohol does not exist in the fermented liquors from which it is procured by distillation, but is, like the essential oils of almond and mustard, formed during that process. The first two of the above processes will, however, clearly demonstrate that such is not the case. The process *a* was first employed by Brande; the process *b* by M. Gay Lussac. The latter chemist has also distilled wine in vacuo at 59° F., and alcohol came over.

Concluding Remarks. Several other methods of alcoholometry have been adopted at various times, besides those just noticed, but the majority have little merit for accuracy, and are therefore quite inapplicable to the purposes of trade in this country. Formerly the strength of spirit was estimated by what was called the "*proof*." A little of the spirit was poured upon a small quantity of gunpowder, in a spoon or saucer, and inflamed; if explosion of the powder followed the combustion of the spirit the sample was said to be above or over proof, but if the contrary, it was declared below or under proof. Hence arose the words proof and proof spirit, which have since been applied to spirit of particular strength by Act of Parliament. *Another method*, is the "preuve d'Holland" of the French, or the *bead* still frequently employed by persons unacquainted with the use of the hydrometer. It consists in shaking the spirit in a vial, and observing the *size*, *number*, and *duration* of the bubbles or "beads," as they are called. The *larger* and *more numerous* these are, and the *more rapidly* they *break* and *disappear*, the *stronger* is deemed the spirit. This method, like the last, can but at best afford a mere approximate idea of the strength of spirits,

while it is liable to be influenced by circumstances, which will affect the sp. gr. in only a very trifling degree. Thus the addition of a little sugar to the spirit, barely sufficient to lower the hydrometer one degree, will sometimes give to a weak sample the appearance of one many degrees stronger. The gunpowder test is even more fallacious, for if one spoonful of a given spirit be just sufficient to fire the powder, *double the quantity* of a spirit 20§ stronger will *fail* to do so. Love's beads are often employed to ascertain the strength of spirit. (See SPEC. GRAV.) The *sudden increase of temperature* produced by mixing a given weight of the spirit with a given weight of pure water being observed by a thermometer has also been proposed for the same purpose, but neither this nor the last method is capable of *great accuracy*. The latter plan would require for its application a series of tables based on experiments which we do not however possess.

Before concluding this imperfect memoir on alcoholometry, I think I cannot better consult the interest of those connected with the spirit trade than by giving them the following important table. It shows by mere inspection the variation in the "richness in alcohol," and in volume, which spirits undergo by change of temperature. Persons purchasing spirits during summer, and paying for them according to their apparent quantity and strength, will lose considerably when the weather becomes colder, without being conscious of such loss from the hydrometer. By the inspection of this table the corrections to be made for change of temperature will become apparent.

TABLE exhibiting the Volume which 1000 gallons of Spirits of different strengths, measured at the given temperatures, will have when measured at 59° F., arranged from GAY LUSSAC's Tables to his Alcoometre, and adapted to Fahr. Scale by Mr. COOLEY.

Pure Alcohol by volume, per cent.	Number of gallons which 1000 gallons of spirit at the given temperatures will measure at 59° Fahrenheit.															
	50°	52°	53½°	55¼°	57½°	59°	60¾°	62½°	64¼°	66¼°	68°	69¾°	71½°	73¼°	75¼°	77°
27	..	..	..	..	..	1000	..	..	..	..	..	..	..	..	996	995
28	..	..	..	..	..	1000	..	..	..	..	..	997	997	996	995½	995
29	..	..	..	..	..	1000	..	..	..	998	998	997	996½	996	995	994½
30	..	..	..	..	..	1000	..	999	999	998	997½	997	996	995½	995	994½
31	..	..	1001	1001	1001	1000	1000	999	998½	998	997	997	996	995½	994½	994½
32	..	1002	1001	1001	1001	1000	1000	999	999	997½	997	996½	996	995½	994½	994
33	1002	1002	1001½	1001	1001	1000	999½	999	998	997½	997	996½	995½	995½	994½	994
34	1002½	1002	1001½	1001	1001	1000	999½	999	999	997½	997	996½	995½	995½	994½	993½
35	1003	1002½	1002	1001½	1001	1000	999½	999	998	997½	997	996½	995½	995	994½	993½
36	1003	1002½	1002	1001½	1001	1000	999½	998½	998	997½	996½	996	995½	995	994½	993½
37	1002½	1002½	1002	1001½	1001	1000	999½	998½	998	997½	996½	996	995½	994½	994	993½
38	1003½	1002½	1002	1001½	1001	1000	999½	998½	998	997½	996½	996	995½	994½	994	993½
39	1003½	1002½	1002	1001½	1001	1000	999½	998½	998	997	996½	996	995	994½	994	993
40	1003½	1002½	1002	1001½	1001	1000	999½	998½	997½	997	996½	996	995	994½	993½	993
41	1003½	1003	1002	1001½	1001	1000	999½	998½	997½	997	996½	995½	995	994	993½	993
42	1003½	1003	1002	1001½	1001	1000	999½	998½	997½	997	996½	995½	995	994	993½	992½
43	1003½	1003	1002	1001½	1001	1000	999½	998	997½	997	996	995½	995	994	993½	992½
44	1004	1003	1002½	1001½	1001	1000	999½	998	997½	997	996	995½	994½	994	993½	992½
45	1004	1003	1002½	1002	1001	1000	999½	998	997½	997	996	995½	994½	993½	993½	992½
46	1004	1003	1002½	1002	1001	1000	999½	998	997½	997	996	995½	994½	993½	993	992½
47	1004	1003	1002½	1002	1001	1000	999½	998	997½	997	996	995	994½	993½	993	992½
48	1004	1003	1002½	1002	1001	1000	999½	998	997½	996½	996	995	994½	993½	993	992½
49	1004	1003½	1002½	1002	1001	1000	999½	998	997½	996½	996	995	994½	993½	992½	992½
50	1004	1003½	1002½	1002	1001	1000	999½	998	997½	996½	996	995	994½	993½	992½	992
51	1004½	1003½	1002½	1002	1001	1000	999½	998	997½	996½	996	995	994	993½	992½	992
52	1004½	1003½	1002½	1002	1001	1000	999½	998	997½	996½	995½	995	994	993½	992½	992
53	1004½	1003½	1002½	1002	1001	1000	999½	998	997½	996½	995½	995	994	993½	992½	991½
54	1004½	1003½	1002½	1002	1001	1000	999½	998	997½	996½	995½	995	994	993½	992½	991½
55	1004½	1003½	1002½	1002	1001	1000	999½	998	997½	996½	995½	995	994	993	992½	991½
56	1004½	1003½	1002½	1002	1001	1000	999½	998	997½	996½	995½	994½	994	993	992½	991½
57	1004½	1003½	1002½	1002	1001	1000	999½	998	997	996½	995½	994½	994	993	992	991½
58	1004½	1003½	1002½	1002	1001	1000	999½	998	997	996½	995½	994½	993½	993	992	991½
59	1004½	1003½	1002½	1002	1001	1000	999½	998	997	996½	995½	994½	993½	993	992	991½
60	1004½	1003½	1002½	1002	1001	1000	999½	998	997	996½	995½	994½	993½	992½	992	991½
61	1004½	1003½	1002½	1002½	1001	1000	999½	998	997	996½	995½	994½	993½	992½	992	991
62	1004½	1003½	1002½	1002½	1001	1000	999½	998	997	996½	995½	994½	993½	992½	991½	991
63	1004½	1003½	1002½	1002½	1001	1000	999½	997½	997	996½	995½	994½	993½	992½	991½	991
64	1004½	1003½	1002½	1002½	1001	1000	999½	997½	997	996½	995½	994½	993½	992½	991½	991
65	1004½	1003½	1002½	1002½	1001	1000	999½	997½	997	996½	995½	994½	993½	992½	991½	991
66	1004½	1003½	1002½	1002½	1001	1000	999½	997½	997	996½	995½	994½	993½	992½	991½	990½
67	1004½	1003½	1002½	1002½	1001	1000	999½	997½	997	996½	995½	994½	993½	992½	991½	990½
68	1004½	1003½	1003	1002½	1001	1000	999½	997½	997	996	995½	994½	993½	992½	991½	990½
69	1004½	1004	1003	1002½	1001	1000	999	997½	996½	996	995½	994½	993½	992½	991½	990½
70	1004½	1004	1003	1002½	1001	1000	999	997½	996½	996	995½	994½	993½	992½	991½	990½
71	1004½	1004	1003	1002½	1001	1000	999	997½	996½	996	995	994½	993½	992½	991½	990½
72	1004½	1004	1003	1002½	1001	1000	999	997½	996½	996	995	994	993½	992½	991½	990½
73	1004½	1004	1003	1002½	1001	1000	999	997½	996½	996	995	994	993	992	991½	990½
74	1004½	1004	1003	1002½	1001	1000	999	997½	996½	996	995	994	993	992	991½	990½
75	1005	1004½	1003	1002½	1001	1000	998½	997½	996½	996	995	994	993	992	991	990½
76	1005	1004½	1003	1002½	1001	1000	998½	997½	996½	996	995	994	993	992	991	990½
77	1005	1004½	1003½	1002½	1001	1000	998½	997½	996½	996	995	994	993	992	991	990½
78	1005	1004½	1003½	1002½	1001	1000	998½	997½	996½	995½	995	993½	993	992	991	990½
79	1005½	1004½	1003½	1002½	1001	1000	998½	997½	996½	995½	995	993½	992½	991½	991	990
80	1005½	1004½	1003½	1002½	1001	1000	998½	997½	996½	995½	994½	993½	992½	991½	990½	990

Table continued.

Pure Alcohol by volume, per cent.	Number of gallons which 1000 gallons of spirit at the given temperatures will measure at 60° Fahrenheit.														
	50°	52°	53¾°	55½°	57½°	60°	62½°	62¾°	64¼°	66¼°	68°	69½°	71¼°	72¼°	73¼°	77°
81	1005½	1004½	1003½	1002½	1001	1000	998½	997½	996½	995½	994½	[illegible]	[illegible]	991½	[illegible]	[illegible]
82	1005½	1004½	1003½	1002½	1001	1000	998½	997½	996½	995½	994½	[illegible]	[illegible]	991½	[illegible]	[illegible]
83	1005½	1004½	1003½	1002½	1001	1000	998½	997½	996½	995½	994½	993½	992½	991½	[illegible]	[illegible]
84	1005½	1004½	1003½	1002½	1001	1000	998½	997½	996½	995½	994½	993½	992½	991½	990½	[illegible]
85	1005½	1004½	1003½	1002½	1001	1000	998½	997½	996½	995½	994½	993½	992½	991½	990½	[illegible]
86	1005½	1004½	1003½	1002½	1001	1000	998½	997½	996½	995½	994½	993½	992½	991½	990½	[illegible]
87	1005½	1004½	1003½	1002½	1001	1000	998½	997½	996½	995½	994½	993½	992½	991½	[illegible]	[illegible]
88	1005½	1004½	1003½	1002½	1001	1000	998½	997½	996½	995½	994½	993½	[illegible]	991½		
89	1005½	1004½	1003½	1002½	1001	1000	998½	997½	996½	995½	994½					
90	1005½	1004½	1003½	1002½	1001	1000	998½	997½	996							
91	1005¾	1004¾	1003¾	..	..	1000										
92	1006	1005	1004	..	..	1000										

ALDEHYDAMMONIA. A compound of carbon, hydrogen, oxygen, and nitrogen, discovered by Doebereiner and Liebig.

Prep. Sulphuric acid 6 parts; water 4 parts; alcohol, of 80%, 4 parts; hyperoxide of manganese in fine powder, 6 parts. *Proc.* Dilute the acid with the water, then carefully add the alcohol, and next the manganese; agitate and distil with a gentle heat, from a spacious retort into a receiver surrounded with ice, and connected with the former perfectly air-tight. When six parts have distilled, re-distil this portion from its own weight of dried muriate of lime, until three parts have come over, which must be again rectified in the same manner, until 1½ part of liquid is obtained in the receiver. This liquid must then be mixed with an equal bulk of ether, and the mixture saturated with dry ammoniacal gas; brilliant colorless prismatic crystals will then form, which, after washing with ether and drying, are pure aldehydammonia.

Prop. &c. Smells like turpentine; melts at 160°; volatilizes, unchanged, at 212°; decomposed by exposure to the air; soluble in most menstrua except ether. *Use.* To make aldehyde.

ALDEHYDE. *Syn.* Hydrate of Oxide of Acetyle. A compound of carbon, hydrogen, and oxygen. Discovered by Liebig.

Prep. Dissolve aldehydammonia in an equal weight of water; place the solution in a retort, and add rather less than an equal quantity of sulphuric acid, diluted with about half its weight of water; then distil as above. Rectify the product twice from its own weight of dried muriate of lime, at a heat not exceeding 86° Fahr.

Prop. An ethereous liquid, boiling at 72°; neutral, inflammable, mixes with water, alcohol, and ether; decomposed by exposure to the air, into liquid acetic acid; spoils by age.

ALDEHYDIC ACID. *Syn.* Acetylous Acid. Lampic Acid. An acid not perfectly known, but supposed by Liebig to be the lampic acid of Davy and Faraday, or at least its essential part.

Prep. Digest oxide of silver in aldehyde, decant and pass sulphureted hydrogen through the liquid to throw down the silver. The product is a weak acid, forming salts called aldehydates with the bases. These salts suffer decomposition during the evaporation of their solutions, and hence cannot be obtained in the dry state.

ALE. *Syn.* Barley Wine. Ala. Cerevisia. A pale-colored liquor, brewed from lightly-dried malt. It is usually described as containing more saccharine matter and mucilage than beer or porter; but this is not a characteristic of the finer kinds of ale, as *Old Burton, Scotch, East India*, and other varieties, that have undergone a thorough fermentation. *New* or *mild ale*, on the contrary, abounds in undecomposed sugar and gum, and is thus rendered more nutritious, though less alcoholic, than the above varieties.

Process of brewing ale. The various operations of brewing are nearly the same for every species of malt liquor, the differences in the products arising from the materials employed, the heat of the water used for mashing, and the temperature at which the fermentation is conducted. (See Brewing.) For ale, pale or lightly-dried malt should be chosen, as well as pale hops, if it be desired to brew a liquor possessing but little color; and the fermentation should be carried on at a low temperature. Almost every county in England has its variety of ale, but the difference consists chiefly (the same quantity of malt and hops being used) in the preparation of the malt. The water may in some cases vary in quality, the boiling may be longer or shorter, or the liquor may be turned on at a different heat; but these circumstances being considered, one general process serves for the whole, as before observed. For immediate use, the malt may be all pale; but if brewed for keeping, or in warm weather, one-fourth should be amber malt. 6 lbs. of Kent hops should be used to the quarter, or 8 to 10 lbs. for keeping ale. The stronger ales contain about 8% of absolute alcohol; ordinary ales from 5 to 6%.

ALE, BARNSTAPLE. Boil the water, then throw two pails of cold water into the mash tun, and afterwards the boiling water; then immediately put in the malt, half a bushel at a time. After stirring it till it is soaked, cap it with malt or bran, cover it close, and let it stand three hours; then see if the mash is sunk in the middle; if so, it must be filled level with boiling water, to stand half an hour; when it should be run off in a goose-quill stream, and be returned upon the grains, by a bowl or pailful at a time, as far back as possible from the cock, until the liquor strains through the body of the grains, and at last comes very fine; otherwise the thick parts are forced

down to the cock. This is called "doubling;" continue to do so for half an hour, then stop, and let it stand half an hour longer in winter, but not in summer. Then rub four pounds of hops very fine into the sieve, for the wort to run through; do not draw it off too near before lading over more boiling water out of the copper. This is to be continued until the whole quantity of ale wort is obtained, which, with all the hops, is to be boiled till the liquor breaks or curdles. Now empty all into large tubs or coolers; work, when cold, with the same hops altogether, thus: put a little yeast, and that not a day old, to a quantity, and mix that with the rest, to work 12 or 14 hours, and then strain it directly into the barrel, where keep filling it until it has done working.

ALE, BAVARIAN. This is a beer which has been made to ferment at a low temperature, until all the substances which favor acetification have been rendered insoluble. The fermentation is conducted in wide, open, shallow vessels, which afford free and unlimited access to atmospheric oxygen, and this in a situation where the temperature does not exceed 46° to 50° Fahr. A separation of the nitrogeneous constituents, *i. e.*, the exciters of acidification, takes place simultaneously on the surface and within the whole body of the liquid. The clearing of the fluid is the sign by which it is known that these matters have separated. The beer obtained in this way is invariably far superior, in quality and stability, to that brewed according to the common method. (Liebig.) To be enabled to keep the temperature at the proper point, the operation is conducted in a situation removed as much as possible from the influence of atmospherical changes of temperature, and at such seasons as are favorable to the same.

ALE, BURTON. This is a strong species of ale, of which only a barrel and a half is drawn from a quarter of malt. Temperature for the *first* mash 170°, and for the second 180°, followed by a mash for table beer at 165°. It is tunned at 58°, and cleansed at 72°. The finest pale malt, ground two days before using, together with the best Kent hops, (6 to 8 lbs. per quarter,) are employed for this ale. *Remarks.* The "East India" ale, brewed by Bass & Co. of Burton, is perhaps as near an approach to wine as malt liquor is capable of receiving; it is indeed the "wine of malt."

ALE, DORCHESTER. This is made with ½ pale and ⅓ amber malt, with 6 or 7 lbs. of hops to the quarter. The temperature of the first mash is 170°, and of the second 180°; boiled for 30 minutes, and the yeast added, when a head gathers on the gyle-tun; work until the head begins to fall, then cleanse and fill up the casks as long as they continue to work. Two barrels per quarter.

ALE, EDINBURGH. Employ the best pale malt. 1st. Mash two barrels per quarter, at 180°; mash three quarters of an hour, let it stand 1 hour, and allow half an hour to run off the wort. 2d. Mash 1 barrel per quarter, at 183°; mash three quarters of an hour, let it stand three quarters of an hour, and tap as before. 3d. Mash one barrel per quarter, at 170°; mash half an hour, let it stand half an hour, and tap as before. The first and second wort may be mixed together, boiling them about an hour or an hour and a quarter, with a quantity of hops proportioned to the time the beer is intended to be kept. The first two may be mixed at the heat of 60° in the gyle-tun, and the second should be fermented separately for small beer.

Remarks. The best hops should be used, in the proportion of about 4 lbs. for every quarter of malt employed.

ALE, ESSEX. This ale is brewed by putting boiling water into the mash-tun, and adding thereto some cold water, and then the malt, gradually, until a cover of dry malt is left on top; it is then allowed to stand three hours; in the mean time a similar mash is made with half the previous quantity of malt, and the same measure of water, in another tun, as soon after the first as possible; both worts are drawn off simultaneously, and the latter serves as a second water for the malt used for the former. The smaller quantity of malt is then mashed a second time with water. The first wort is boiled an hour, or until it breaks into large flakes, when half of it is taken out, and the remaining raw wort added to it, and the boiling continued until it again *breaks*. The wort is now drained off from the grains and boiled, and a fresh mash made with the wort from the second tun, for the larger quantity of malt, and very hot water for the other; after an hour it is drawn off, and another mash made for small beer. The proportion of hops is 2½ lbs. per quarter. This system of mashing, which has no advantage over the usual way, has been called "succession mashing."

ALE FOR PRIVATE FAMILIES. A bushel and three quarters of ground malt and a pound of hops are sufficient to make 18 gallons of good family ale. That the saccharine matter of the malt may be extracted by infusion, without the farina, the temperature of the water should not exceed 165° or 170° Fahrenheit's thermometer. The quantity of water should be divided into two portions, one of which should be poured upon the malt as speedily as possible, and the whole being well mixed together by active stirring, the vessel should be closely covered over for an hour; if the weather be cold, for an hour and a half. If hard water be employed, it should be boiled, and the temperature allowed, by exposure to the atmosphere, to fall to about 165° Fahr.; but if rain water is used, it may be added to the malt as soon as it reaches the point. After standing the proper time, the wort must be drawn off into another vessel, and the second portion of the water poured on, which should be allowed to mash an hour. The first wort may then be boiled with ½ lb. of hops for one hour, by which time the second mashing will be ready to be drawn off, and should be boiled for half an hour, with ½ lb. of fresh hops. The two liquors should now be mixed and cooled down to the temperature of 60° or 65°, when a pint of good thick yeast should be well stirred in, and as soon as the fermentation is completed, the liquor may be drawn off into a clean cask previously rinsed with boiling water. When the slow fermentation which will ensue has ceased, the cask should be loosely bunged for two days, after which, if the liquor be left quiet, the bung may be properly fastened.

Pale malt is the best, because, when highly dried, it does not afford so much saccharine matter. If the malt be new, it should be exposed to the air, in a dry room, for two days previously to its being used. A third mashing may be made for table beer.

ALE, LONDON. I. Pale malt, 14 quarters; hops, 112 lbs.; mash with 28, 18, and 18 barrels of water; boil with the hops, cool, and set with 36 lbs. of yeast; cleanse with salt, 3 lbs. *Prod.* 34 barrels, or 1⅓ gallon for each gallon of malt employed.

II. (*To brew two barrels from a quarter of malt.*) Turn on two barrels at 175°; mash one hour, and let it stand for the same time. For second mash, turn on one barrel at 160°; mash one hour, and stand one hour: boil the first wort briskly for one hour; and boil the second two hours, or till the whole is two barrels. Cool down to 60°, and tun. Cleanse on the fourth day at 72°, previously mixing in 2 ounces of ginger, ½ an ounce of salt, and a handful of flour. Keep the working tun closely covered, and just before the head begins to fall, skim the top, and rouse in the rest. When the blebs are large and on the fret, rouse in ½ an ounce of salt, a handful of malted bean-flour, and some fresh yeast, after which it will ferment more kindly, and the cleansing may soon follow, with the new head on. Take care to fill up the casks while working, and before bunging put a handful of scalded hops into each.

ALE, NOTTINGHAM. This is usually brewed by three mashings in the common way, but a much longer time is occupied in the mashing, and after drawing off each wort, the grains are washed by pouring over them fresh water from the copper, by two or three bowlfuls at a time. The boiling is conducted in separate portions for each wort, and the hops, enclosed in a coarse canvass bag, are only allowed to boil for half an hour, when they are taken out, and the boiling continued until the bubbles break into little ragged particles. The quantity of hops is divided between the boilings, and frequently the second and third worts are boiled together.

ALE, RINGWOOD. This brewing produces two barrels and a half from the quarter. The best pale malt and pocket hops are used, at the rate of 6 lbs. to the quarter. Turn on first mash at 180°, and second mash at 190°. Pitch the tun at 60°, and cleanse at 80°. Mash successively one hour, and three quarters of an hour, standing an hour and a half, and two hours. Add in the tun 2 lbs. of yeast for every barrel, and coat with salt and flour after the first skimming.

ALE, SCOTCH. This ale is brewed from the finest pale malt, (made from the best English barley,) and the best *East Kent Hops*, or for long keeping, *Farnham's* or *Country's*. The brewing is restricted to the colder portions of the year, as it never succeeds so well during the months of May, June, July, August, and September. Only *one mash* is made, and that at a temperature of about 180°, with one-third of the quantity of the water necessary for the brewing. The mash-tun is then covered up for half an hour, when the wort is drawn off, and a quantity of water, at the same temperature as before, sprinkled uniformly over its surface. This is performed by throwing the water into a vessel with a bottom full of holes, somewhat resembling a shower-bath, from whence it descends and gets equally distributed over every portion of the malt. After an interval of about twenty minutes, this wort is drawn off from several small cocks or holes, placed round the circumference of the bottom, by which means the hot water is made to percolate equally through every particle of the mass. This operation, called "sparging," is performed a second time, with a fresh portion of hot water, and after a like interval, is again drawn off. This process is repeated several times, until the density of the mixed worts becomes adapted to the quality of the ale required Usually eight or ten "spargings" are employed, the latter at about 5° or 10° cooler than the first The skilful brewer so divides his water that it may produce a wort of the proper gravity; but when a very strong one is required, the latter "sparges" are used for table beer, or as water for mashing a fresh quantity of malt. In this way, 1 quarter of malt will yield full 81 lbs. of extract. The wort is next boiled, with 4 lbs. of hops to every quarter of malt, and afterwards cooled down to 50° before adding the yeast. The latter must not exceed half a gallon for every 100 gallons of wort. The fermentation now commences and proceeds slowly, and in some brewings is accelerated by rousing up twice a day. Should more yeast be absolutely required in a few days, a *little* may be added. The fermentation generally continues for 15 to 20 days; and the ale is not cleansed before the degree of attenuation does not exceed ¼ lb. per diem, and not more than ¼ of the original gravity of the wort remains. This process is then performed by drawing off without skimming. As soon as the fermentation is finished, the ale is put into carefully prepared casks, and stored in a cold cellar. Here it soon becomes fine, and seldom wants racking before sale. The usual gravity per barrel of the best Scotch ale is about 38 or 40 lbs., and is seldom lower than 32 lbs. or higher than 44 lbs.

ALE, TABLE. This is usually made by mashing the grains after the wort for the strong ale or beer has been drawn off; but if a separate brewing be made, the following are good proportions:— Pale malt 1 quarter; mash with 4, 3, and 2½ barrels of water; boil with 5 lbs. of hops, set with 1 gallon of yeast, and cleanse by beating the head in and letting it work out. *Prod.* 8½ barrels, or full 4 gallons of ale for 1 of malt.

ALE, WELSH. Take 3 quarters of the best pale malt and 25 lbs. of hops; turn on the first liquor at 178°. Mash for an hour and a half, and stand two hours. Turn on second liquor at 190°, and stand two hours. Boil an hour and a half; pitch the tun at 62°, and cleanse at 80°, using salt and flour. After the second mash, turn on for table beer at 150°. Mash three quarters of an hour, and stand two hours.

ALE, WHITE, (DEVONSHIRE.) Boil together 12 gallons of pale ale-wort, 1 handful of hops, and 4 or 5 lbs. of grouts; cool, and add of yeast 3 lbs When it is in a state of lively fermentation, bottle in strong stone half-pints; well cork them down, and wire them. *Remarks.* This is much drunk in some parts of Devonshire. It effervesces when opened.

ALE, WINDSOR. This ale is brewed from

the best pale malt and hops. Turn on the first water at 180°; mash 1½ hour, and stand 1 hour; boil 1 hour. Turn on the second liquor at 190°; stand ¾ of an hour; boil 3 hours. Turn on the third liquor at 165°; mash ¾ of an hour; stand ¾ of an hour. Pitch the tun at 60°; cleanse at 80° on the third day. Skim as soon as a close yeasty head appears, until the yeast ceases to rise, then rouse in ½ lb. of hops per quarter.

ALE, YORKSHIRE OAT. The malt used is made from oats of the white sort, and dried with coke. Mash 1 quarter of ground malt with 44 gallons of cold soft water, and let it stand 12 hours; then draw off the wort, and infuse therein for 3 hours 2 lbs. of hops, well rubbed between the hands; next strain; tun it, and work it briskly with yeast for two or three days; cleanse, and in ten days it will be fit to bottle. It drinks very smooth, brisk, and pleasant, but will not keep. It looks very much like white wine.

ALIZARINE. *Syn.* PURE MADDER RED. *Prep.* I. Expose madder red to a gentle heat, when the alizarine will sublime, and may be collected.

II. Add powdered madder cautiously to its own weight of oil of vitriol, and mix with a glass rod; then wash the charred mass with clean cold water; dry, and sublime as before.

Prop. Orange-red crystals, very soluble in alkaline solutions, which it colors violet; dyes mordanted cloth red. *Remark.* The name is derived from Ali-zari, the commercial name of madder, in the Levant.

ALKALIS. (From the Arabic *al*, an essence, and *kali*, the plant from which soda was first obtained.) Substances which possess the property of forming salts with the acids, and for the most part of turning the vegetable blues to greens, and yellow turmeric paper *brown*. The principal alkalis are *soda*, *potassa*, and *ammonia*. The *first* has been called the *mineral*, the *second* the *vegetable*, and the *third* the *volatile* alkali; but this distinction is now nearly obsolete. Soda and potassa have also been called the fixed alkalis, from their permanence in the fire.

Hist. At the time when Lavoisier declared oxygen to be the universal acidifying principle, Morveau conjectured hydrogen to be the alkalifying principle; but it was afterwards demonstrated by Sir H. Davy, that potassa and soda are actually the oxides of the metals, potassium and sodium. Ammonia is a compound of nitrogen and hydrogen. Dr. Murray conceived that either hydrogen or oxygen might generate alkalinity, but that a combination of the two was necessary to give this condition in its utmost energy. This theory is not, however, borne out by the observed phenomena of chemistry. Gay Lussac conceives alkalinity to be the result of "the alkalifying property of the metal, and the acidifying property of the oxygen, modified both by combination and by the proportions;" but this "coalition" theory is far from satisfactory. Of late years the list of alkalis has been greatly extended by the discovery of several vegetable principles possessing important properties and forming salts with the acids. (See ALKALOIDS.)

Prop., Char., &c. Potassa, soda, and ammonia, are known by the following characteristics:—An acid urinous taste; a great degree of causticity; turning vegetable blues green, and yellows brown; forming soaps with the fixed oils; solubility in water, and when pure in alcohol; forming salts with the acids; solubility of their carbonates; action of their carbonates on vegetable colors.

Caution. The pure or caustic alkalis should be kept in glass bottles, well secured from the air, as they rapidly absorb carbonic acid and become carbonates.

ALKALIMETER. A measurer of alkalinity.

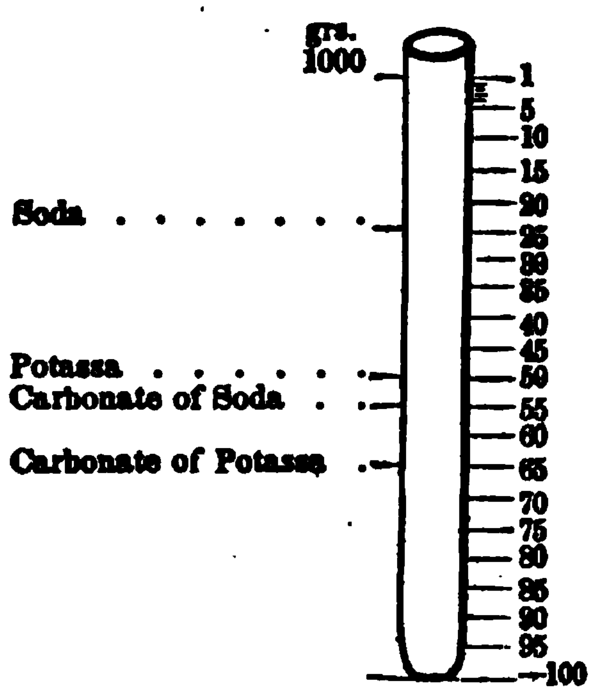
ALKALIMETRY. The art or method of determining the amount of pure alkali contained in any given sample.

Remarks on the principles of alkalimetry, &c. The common method of alkalimetry is founded on the known quantity of pure alkali, which is required to saturate a given weight of dilute sulphuric acid. The glasses, or alkalimeters, as they are called, with which the operation is performed, are usually graduated into 100 parts, for the purpose of exactly estimating the quantity of acid employed. As the sulphuric acid, however, acts upon the muriates and sulphurets usually present in the alkalis of commerce, this plan does not admit of great accuracy, unless proper precautions are taken to avoid the source of error. Some years ago the German soap-boilers estimated the strength of their ashes by merely pouring a quart of water on a pound of the former, and then putting in a piece of Dutch soap, added water, in small portions at a time, until it sank. The more water required to effect this object, the richer the ashes were supposed to be in alkali. This plan was also employed at no very distant period in some of the remoter parts of the United Kingdom. Alkalimetry has lately engaged the attention of some eminent chemists, and by following their suggestions, the "richness" of any sample of ashes, barilla, or alkalis may be obtained with great precision. The importance of this subject to the soap-maker and manufacturing chemist must at once be evident. The following are among the most approved methods of procedure.

I. *Oper.* Pulverize a little of the sample, and weigh therefrom exactly 100 grs., agitate it with about half an ounce of hot water in a vial or small tube, then allow it to settle, and pour off the clear into another tube or vial; repeat the process with a second and third portion of hot water, or until nothing soluble remains, observing each time to allow the liquid to settle before pouring it off; the mixed liquid is then tested as follows:—the test acid described below is poured into the glass tube until it reaches exactly to the line marked by the name of the alkali under examination; water is then poured in to the line marked 1 or 1000, and the whole is well mixed by placing the thumb on the orifice of the tube and shaking it well. The measure of this dilute acid must then be carefully observed, and water added to make up the proper quantity as before; should it be lower than the mark, agitation being again employed. The test liquor thus prepared is then to be *carefully* added to the solution of the alkali just described until it be *perfectly neutralized*. The quantity of the test liquor used must next be read off from the graduated part of the tube, each larger division of which will represent 1 gr. per cent. of the pure

alkali, or its carbonate, as the case may be, in the sample under examination.

The glass tube, or *Faraday's alkalimeter*, as it is called, is here represented, and is about 9⅓ inches long, and ¾ of an inch wide; it is graduated into 100 parts, each of which represents 10 grs. of water. Opposite the numbers 23·44, 48·96, 54·63, and 65, are cut the words written in the margin, and indicate the quantity of test acid to be employed for each of these alkalis. The test acid being then poured in up to the proper marks, and the tube filled up to 1000 with pure water, gives a test solution equal to 100 grs. of the given alkalis. Consequently, the number of its divisions consumed to produce saturation, will exactly express the value per cent.



The test acid is prepared by adding pure water to pure sulphuric acid until the specific gravity is reduced to 1·127 at 60° F., (about 1 measure of acid to 4 of water.) The sp. gr. must be carefully ascertained by means of the sp. gr. bottle, and its strength checked by adding to 100 grs. of it, chloride of barium until it no longer produces a precipitate. This, when washed and dried at a low red heat, contains 33·3 per cent. of sulphuric acid, from which the strength of the test acid may be calculated. This is an *easy* method of alkalimetry, and admits of ascertaining the quantity of alkali to the ⅓ or ¼ of 1 per cent. It is best to keep a quantity of the test acid always ready prepared, as it saves trouble. Should a Faraday's alkalimeter not be at hand, any other mode by which the test liquor can be accurately measured will do as well.

II. Dissolve 100 grs. of alkali, as described in the last method, then take a known weight of the test acid prepared as directed below, and proceed to neutralize the alkaline solution therewith in the way above mentioned; then again weigh the test acid and note the quantity consumed; the loss of weight divided by 10 gives the real per centage of pure alkali.

Test acid for soda. Add pure sulphuric acid to distilled water until the sp. gr. becomes about 1·109 (about 5 water and 1 acid,) and 100 grs. of which saturate exactly 17 grs. of pure carbonate of soda dried at a dull red heat; or which is the same, 313 grs. should contain exactly 40 grs. of real sulphuric acid, when 10 grs. will be equivalent to 1 gr. of pure soda. The strength may be also tested by chloride of barium.

Test acid for potassa. This acid should be weaker than the last, its sp. gr. about 1·069 or 1·070; 471⅓ grs. should contain exactly 40 grs. of real sulphuric acid, and 1000 grs. should neutralize exactly 66⅓ grs. of dry carbonate of soda.

Remarks. The most convenient vessel to contain the test acid during the operation is Schuster's alkalimeter, described under the article ACETIMETRY. This method of alkalimetry admits of great accuracy. By careful manipulation the content of real alkali may be estimated to the one-tenth of 1 per cent. (C. Watt, jun., Chemist, No. 50.) The art of weighing admits of much greater accuracy than that of measuring, especially where small quantities are concerned. This is the method employed at Apothecary's Hall, at the Polytechnic Institution, (by Mr. L. Thompson,) in the Laboratory of Messrs. Hawes, and in various other places where great precision is desired.

III. (*Method of Fresenius and Will, of Giessen.*) *Oper.* The flask *B* (article ACIDIMETRY) is about half filled with oil of vitriol, and the sample of alkali is put into the flask *A*, and water poured on until it be almost half full. The tubes are then fitted into the apparatus quite air-tight; the end of the tube *b* is fastened with a bit of wax, and the whole is carefully weighed. The apparatus is now removed from the scales, and the mouth applied to the end of the tube *h*, and the air in the flask *B* rarefied by suction; the consequence of which is, that the oil of vitriol in *B* flows over into *A*. The evolution of carbonic acid immediately commences, which, from the construction of the apparatus, has to pass through the oil of vitriol, before it can escape by the tube *d*, by which means it is rendered quite dry. Whenever the effervescence flags, a little more acid must be sucked over, until the whole of the carbonate be decomposed, after which an additional quantity is made to pass into *A* sufficient to raise the temperature considerably, which will have the effect of expelling all the gas absorbed by the fluid during the operation. As soon as this is completed, the wax is removed from the aperture *b*, and suction applied to *h* until all the carbonic acid gas in the apparatus is replaced by atmospheric air. The whole must now be allowed to cool, when it must be again weighed. *The loss of weight* gives exactly the amount of *dry carbonic acid gas* that was contained in the specimen, from which the weight of pure alkali is estimated. Every 22·12 grs. of dry carbonic acid gas represent exactly 31·3 grs. of pure soda, and 47·15 grs. of pure potassa.

Remarks. Should the specimen contain *caustic potassa*, (as many of those of commerce do,) it should be triturated, previously to testing, with an equal weight of pure quartz sand, and about ¼ of its weight of carbonate of ammonia added; the mixture is then placed in a capsule and moistened with water, and a gentle heat applied until it be quite dry, and all the ammonia expelled. Should sulphuret of potassium or caustic soda be present in the sample, the same method must be followed, except that instead of water the powder should be moistened with liquor of ammonia; and in the case of soda, the quantity of carbonate of ammonia should be at least equal to half the weight of the test specimen. It will thus be seen that unless for *carbonates*, (unmixed with *sulphurets*, *bicar-*

bonates, or *caustic alkali*,) this method requires several operations, and is consequently very troublesome and liable to error, except in expert hands. It is, however, a ready and elegant way of testing the pure carbonates.

Concluding remarks on Alkalimetry. Rules for sampling, &c. As each sample is taken from the cask, place it at once in a *wide-mouth* bottle, cork it up immediately and number it. The sample should be drawn from as near the centre of the cask as possible. Before proceeding to the assay, throw the contents of the bottle upon a piece of clean paper, crush the lumps, and mix them with the *small;* reduce the whole to coarse powder as rapidly as possible, and weigh the number of grains for trial at *once*. In a number of casks, at least ⅛ of them should be tested. Assays of soda should never be made while warm, as it will thereby frequently indicate 1 or 2 per cent. more alkàli than when it has been cooled down and packed in casks. The method of trying the density of the test acid by merely dropping a bead of a known sp. gr. into it, as is frequently recommended by chemical reformers, is not sufficiently accurate to be depended on. Too much care cannot be taken to ensure the test acid of the proper strength, of which the sp. gr. alone is an insufficient proof. It is always best to keep a stock of the test acid (properly made and proved) ready for use.

Those desirous of entering more largely into the subject of acidimetry, alkalimetry, &c., are referred to Bullock's "Translation of Fresenius and Will;" some valuable papers by Mr. C. Watt, jun., in the fifth volume of the "Chemist;" and to a paper by Dr. Ure, in the third volume of the "Pharmaceutical Transactions."

ALKALOIDS. *Syn.* VEGETABLE ALKALIS. ORGANIC ALKALIS. ORGANIC BASES. Substances possessing basic and alkaline properties derived from the vegetable kingdom. They are compounds of carbon, hydrogen, azote, and oxygen, and have hence been distinguished by Dr. Collier, by the mnemonic word, "*chaos*," the first four letters being the initials of the elements, and the "s" showing that they are salifiable. Some of the alkaloids are the most violent poisons with which we are acquainted; one-fiftieth of a grain of pure aconitina has endangered life. (Pereira.) The greater number possess similar properties to the plant from which they are extracted, but in an eminently concentrated degree. The following table exhibits the principal alkaloids described in the body of this work, together with the plants which yield them:

Alkaloids.	*Plants.*
Aconitina	Aconitum Napellus.
Aricina	Arica Bark.
Atropia	Atropia Belladonna.
Brucia	Strychnos Nux Vomica.
Cinchonia	Cinchona Lancifolia.
Codeia	Opium.
Conia	Conia Maculatum.
Corydalia	Corydalis Tuberosa.
Cynapia	Æthusa Cynapium.
Daturia	Datura Stramonium.
Delphia	Delphinium Staphisagria.
Digitalia	Digitalis Purpurea.
Emetina	Cephaelis Ipecacuanha.
Hyoscyamia	Hyoscyamus Niger.
Meconia, Morphia, Narceia, Narcotina	Opium.
Nicotina	Nicotiana Tabacum.
Picrotoxia	Menispermum Coculus.
Quinia	Cinchona Cordifolia.
Sanguinaria	Sanguinaria Canadensis.
Solania	Solanum Nigrum.
Thebaia	Opium.
Veratria	Veratrum Sabadilla.

The following general method of procuring the alkaloids will be found applicable to such as full directions are not given for under their respective heads.

1. (*When the base is insoluble in water, non-volatile, and existing in the plant in an insoluble form.*) *Proc.* Boil or macerate the bruised plant in water acidulated with muriatic acid, filter, neutralize the acid with an alkali, (ammonia, lime, or magnesia,) and collect the precipitate, which must be purified by resolution in dilute acid, digestion with animal charcoal, and subsequent crystallization or precipitation by an alkali; or the first precipitate may be purified by dissolving it repeatedly in alcohol.

2. (*When the base is insoluble in water, and non-volatile, but existing in the plant in a soluble state.*) *Proc.* Boil or macerate in hot water as before; filter and precipitate by adding an alkali; purify as last.

3. (*When the base is soluble in water, and non-volatile.*) *Proc.* Make an infusion with a dilute acid, (muriatic;) concentrate by a gentle heat; treat the liquor with potassa and ether, (conjointly;) decant and evaporate.

4. (*When the base is both soluble in water and volatile.*) *Proc.* The vegetable or its extract may be mixed with potassa and distilled; the product, neutralized with oxalic or sulphuric acid, carefully evaporated to dryness, and digested in alcohol, and this solution agitated with potassa and ether; the ethereal solution thus formed, if carefully evaporated, leaves the base nearly pure. It may be further purified by cautious distillation.

Remarks. The above is a mere view of the four general processes of extracting the alkaloids, which, for success, require considerable address in manipulating. The plan adopted for the extraction of the principal alkaloids of commerce, will be found fully described under their respective heads.

ALKALOIDS, TESTS FOR THE. Perchloride of gold is a more decisive test of certain vegetable alkalis than the double chloride of sodium and gold, already employed for this purpose. The following are the colors of the precipitates which it produces with the salts of the annexed alkalis dissolved in water: quinine, buff-colored; cinchonine, sulphur-yellow; morphine, yellow, then bluish, and lastly, violet; in this last state the gold is reduced, and the precipitate is insoluble in water, alcohol, the caustic alkalis, and sulphuric, nitric, or hydro-chloric acids; it forms with aqua regia a solution which is precipitated by protosulphate of iron; brucine, milk-, coffee-, and

then chocolate-brown; strychnine, canary-yellow; veratrine, slightly greenish-yellow.

All these precipitates, with the exception mentioned, are very soluble in alcohol, insoluble in ether, and slightly soluble in water.

Among the reactions of chloride of gold, there are two which appear to be especially important: they are those which occur with morphine and brucine; these are sufficiently marked to prevent these alkalis from being mistaken for each other, and also yield pretty good characteristics for distinguishing brucine from strychnine. (MM. Larocque and Thibierge.)

The above authors have arrived at the following conclusions:

1st. By the aid of reagents it is possible to determine the presence of morphine, strychnine, and brucine in substances which, after being mixed with the salts of these alkalis, have undergone the vinous, acetic, or putrefactive fermentation. M. Orfila has already shown that the putrefactive fermentation does not alter morphine.

2d. Crystallized iodic acid, or a concentrated solution of this acid, is susceptible of being decomposed by neutral azotized bodies; but a dilute solution of this acid cannot be decomposed by them unless there be added concentrated sulphuric acid, crystallizable acetic acid, oxalic, citric, or tartaric acid.

3d. Iodic acid should not be employed as a test of morphine without the greatest caution.

4th. Perchloride of gold produces such effects with the vegetable alkalis, as serve to distinguish morphine, brucine, and strychnine from each other.

5th. The reagents on which the greatest reliance may be placed as tests of morphine are, nitric acid, neutral perchloride of iron, and perchloride of gold.

6th. By the use of reagents, morphine which has been mixed with beer, soup, or milk, may be detected.

7th. It is also easy to prove by reagents the presence of meconic acid in soup or milk, especially when the meconate of lead is decomposed by dilute sulphuric acid. (Phil. Mag., Dec., 1842.)

ALKANET. *Syn.* Alkanet Root. *Qual., use, &c.* The best alkanet is brought from the neighborhood of Montpellier. The bark contains a beautiful red color, which it freely gives to oils, fats, wax, spirits, essences, and similar substances, by simple infusion, and is consequently much employed to color varnishes, ointment, pomatums, &c. Wax, tinged with alkanet and applied on warm marble, stains it of a beautiful flesh-color, which sinks deep into the stone, and is possessed of considerable permanence. The spirituous tincture of alkanet gives a deep red to marble.

In selecting this article, the smaller roots should be chosen, as they possess more bark than the larger ones in proportion to their weight.

ALKERMES. A cordial liqueur much esteemed in some parts of the south of Europe.

Prep. I. *Ing.* Bay leaves 1 lb., mace 1 lb., nutmegs and cinnamon, each 2 oz.; cloves 1 oz., all bruised; cognac brandy 3½ gallons. *Proc.* Macerate for 3 weeks, frequently shaking, then distil over 3 gallons, and add clarified sirup of kermes 18 lbs., orange flower water 1 pint; mix well and bottle. *Remarks.* The above is the true formula for the alkermes de Santa Maria Novella, which is much valued.

II. Spice as last, 4 gallons of British brandy, water 1 gallon; macerate as before, and draw over 4 gallons, to which add 2 gallons of capillaire, and 4 oz. of sweet spirits of nitre. (Cassia may be used for cinnamon.)

ALLANTOIN. *Syn.* Allantoine. Allantoic Acid. *Hist.* Discovered by Vauquelin and Buniva in the allantoic fluid of the cow. It has since been produced artificially by Wohler and Liebig.

Prep. I. Evaporate the allantoic fluid of the cow to ¼ or ⅕ of its volume, when, on cooling and standing for some time, crystals will be deposited These must be purified by resolution, digestion with animal charcoal, and recrystallization.

II. Boil 1 part of uric acid in 20 parts of water, then add thereto, gradually, freshly-precipitated and well-washed oxide of lead until the color ceases to change. Filter while hot, evaporate until a pellicle forms on the surface, and set it aside to crystallize. Purify as above.

Prop. Small prismatic crystals, scarcely soluble in water; nitric acid converts it into allanturic acid.

ALLANTURIC ACID. A new nitrogeneous acid, discovered by Pelouze, produced by the action of nitric acid on allantoin. The name is derived from allantoin and uric acid, the new compound being made from the former, and being analogous in composition to the latter.

Prep. Dissolve allantoin in nitric acid (1·2 to 1·4) with a gentle heat; on cooling, pour the liquor from the crystals of nitrate of urea which are deposited, evaporate, and dry at 80° F. Treat the residuum with weak water of ammonia, and add alcohol; collect the white viscid matter thrown down, redissolve it in water, and again precipitate it with alcohol; the last precipitate is the acid.

Prop. Little is known about it.

ALLIGATION. An arithmetical rule for finding the price of mixtures, and for making mixtures of any given price or value. From its great use in trade, and ease of performance, it should be understood by every tradesman. (Vide Joyce or Walkingame.) Questions in alligation may also be very easily determined by the method of indeterminate analysis, by persons but slightly conversant with elementary algebra. This rule has been applied to ascertain the proportions of compounds from their sp. gr. when they have undergone no change in volume; but when this is the case, as in alloys, alcoholic mixtures, &c., it is quite inapplicable.

ALLOXAN. *Syn.* Erythric Acid. A product of the decomposition of uric acid by nitric acid, first noticed by Brugnatelli, and afterwards by Wohler and Liebig.

Prep. Gradually add uric acid to nitric acid (sp. gr. 1·35) gently heated, until crystals begin to appear; then cool, and throw the mass on a funnel choked with asbestos to drain, and afterwards drop on it a little cold water, to displace the last adhering portions of acid liquor; when well drained dissolve in water, and crystallize, employing but little heat. The acid liquor will yield 4 or 5 crops of crystals by treating it as often with fresh uric acid. *Prod.* 80 to 90% of the uric acid employed.

Prop. Crystals efflorescent; treated with alkalis it yields alloxanic acid.

ALLOXANIC ACID. An acid discovered by Wohler and Liebig; it is formed when alloxan is decomposed by the alkalis. *Prep.* Treat an aqueous solution of alloxan with baryta water, and decompose the alloxanate of Barytes formed with dilute sulphuric acid; decant, evaporate, and crystallize. *Prop.* With the bases it forms salts called *alloxanates;* these may generally be made from the alloxanate of baryta or ammonia by double decomposition; some of them are soluble.

ALLOXANTINE. Obtained by Prout from uric acid.

Prep. I. Boil 1 part of uric acid in 32 parts of water, and add dilute nitric acid until it be dissolved; evaporate to ⅔ds, and set it aside for 12 hours; the crystals, which will then be found deposited, must be purified by resolution and crystallization.

II. Dissolve alloxan in water, and pass sulphuretted hydrogen gas through the solution, until the alloxantine be deposited as a crystalline mass, which must be purified by resolution and crystallization.

ALLOY. *Syn.* Allay. Alliage, (*Fr.*) Legirung, (*Ger.*) (From the French verb *Alloyer*, to mix one metal with another for the purposes of coinage.) Combinations of the metals with each other obtained by fusion. The term was formerly restricted to gold and silver when mixed with metals of inferior value, but is now applied to any mixture of two or more metals.

Prop. Most of the metals unite with each other by fusion or amalgamation, and acquire new properties. Thus: *copper,* alloyed with *zinc,* becomes *brass,* and possesses a different density, hardness, and color to either of its constituents. It is yet undecided whether alloys tend to be formed in definite or equivalent proportions of the metals of which they are composed, or unite in any ratio, like sugar and water. The proportions contained in the natural alloys of gold and silver, as well as some phenomena attending the cooling of several alloys, from a state of fusion, go far to show the former to be the case. (Rudberg.) As, however, the metallic compounds are generally soluble in each other, or combine by fusion and mixture, their nature is much obscured. Alloys generally melt at lower temperatures than those required for the fusion of their separate metals, which affords strong evidence of a chemical change having taken place. They also usually possess more tenacity and hardness than the mean of their constituents; but their malleability, ductility, and their power of resisting oxygen are diminished. The combination of two brittle metals is always *brittle;* that of a brittle and a ductile metal *generally so;* and this is also sometimes the case with two *ductile* metals. From the number of the metals, it is evident that several hundred combinations may be made, but about 60 are all that have been carefully examined by the chemist, and not more than ⅓d part of that number has been applied to useful purposes. Among these, however, may be found some possessing most valuable properties, not to be met with in the pure metals.

Prep. No general rules for the manufacture of alloys applicable to each can be given; but it may be remarked that, in uniting those metals, differing greatly in their fusibility, the more fusible one should not be added to the other until it be melted, or sufficiently heated, and then at the lowest possible temperature at which a perfect union will take place between the two, lest the more fusible one should evaporate or be oxidized, and thus cause the compound to be imperfect. The mixture is usually effected under a flux, or some material that will prevent evaporation and exposure to the atmosphere. Thus: in melting lead and tin together, in forming solder, resin or tallow is thrown upon the surface; in tinning copper, the surface is rubbed with sal ammonia; and in combining some metals, powdered charcoal is used for the same purpose. For further information on this subject, the reader is referred to the following table, and to the separate articles devoted to the more important alloys. (See Bronze, Brass, Pewter, &c.)

Table of the principal Alloys.

Combining metals.	*Alloys produced.*
Arsenic and copper . . .	White Copper or Packfong.
Tin and Lead	Solder and Common Pewter
Tin with Antimony, Copper, and Bismuth	Best Pewter or Britannia Metal.
Tin with Lead and Bismuth	Fusible Metal.
Tin and Copper	Bronze Metal, Speculum do. Bell do. Cannon do.
Copper and zinc	Brass. Dutch gold.
Copper with Zinc, Nickel, and Iron	German silver.
Silver and Copper . . .	Standard Silver.
Gold with Copper and Silver	Do. Gold.
Mercury and other Metals	Amalgams.

(See also Amalgams.)

ALMOND TREE, (Amygdalus communis.) The kernels, *sweet almonds*, are pectoral and cooling, but mawkish; imported from the south of Europe and the Barbary coast. *Blanched almonds.* Almonds thrown into boiling water until the skin comes off by pressing between the fingers, the hot water is then strained away, the almonds flung into cold water, peeled, and dried, either in a stove or the sun, until they are brittle. *Burnt almonds.* Used to color and flavor liqueurs. *Bitter almonds.* A variety, imported from Mogadore, used to relieve the flavor of the sweet almonds, and to clear muddy water; both pressed for oil. *Almond cake,* left on pressing the oil, used for washing the hands.

Remarks. Almonds are principally used for obtaining the oil; and in medicine for the preparation of a confection and mixture; and in confectionary, as an agreeable flavoring, &c.

ALMOND FLAVOR. *Syn.* Essence of bitter Almonds. Essence of peach Kernels. Quintessence of Noyeau, &c. *Prep.* Dissolve 1 oz. of essential oil of bitter almonds in 1 pint of spirits of wine.

Prop., uses, &c. Used as a flavoring for wine, cordials, perfumery, pastry, &c., and in any case where it is wished to impart an agreeable nutty flavor or smell; also to prepare bitter almond water. *Caution.* It should be used in very small quantities, as it is very powerful. *A few drops are sufficient for several pounds of pastry.*

ALMONDS, TO CANDY. *Oper.* Blanch

any quantity of almonds, then fry or bake them in butter, until they acquire a light brown color; wipe them with a napkin, pour over them sirup, (boiled to a thread,) and stir until cold.

Remarks. According to Mrs. Rundel, almonds so prepared were highly thought of by the London guests of his Highness Prince Ekbaladoola, the Nawaub of Oude, from whose cook this receipt was obtained.

ALMOND PASTE. *Prep.* Blanched almonds 4 oz.; white of 1 egg; spirit of wine and rose water, q. s. *Proc.* Beat the almonds to a smooth paste in a mortar, then add the white of egg and enough rose-water, mixed with ½ its weight of spirit of wine, to give the proper consistence. *Use.* As a cosmetic, to prevent chapped hands, &c.

Remark. The skins will easily come off if the almonds be immersed for a few minutes in boiling hot water.

ALOES. As there are several descriptions of this drug, and the commoner sorts are frequently sold for the more expensive, the following characteristics will assist the reader in recognising such deceptions.

ALOES, SOCOTRINE. *Char.* Color, garnet red to golden red; smell, peculiar and aromatic, not unlike a decaying russet apple, especially when breathed on or warmed; taste, permanently and intensely bitter; fracture, conchoidal; softens in the hand and becomes adhesive, yet retains considerable brittleness; powder, *bright golden yellow color;* central portions of the lumps often soft, especially when first imported. The Ed. Ph. states that socotrine aloes should be "in thin pieces, translucent and garnet red, almost entirely soluble in spirit of the strength of sherry; very rare."

ALOES, HEPATIC. *Char.* Less odorous, darker-colored, and more opaque than the preceding; digested in spirit of wine, gives a yellow granular powder, resembling lycopodium, and insoluble in water, alcohol, ether, and dilute sulphuric acid; but freely soluble in liquor of potassa, which it turns red. *Remarks.* The finer and paler samples of this aloes constitute the mass of what is sold for socotrine. It yields a powder of a duller color than the latter.

ALOES, BARBADOES. *Char.* Color, dark brown or black; smell, strong and unpleasant, especially when breathed upon; powder, *dull olive yellow.*

ALOES, CAPE. *Char.* Smell, stronger than the last; color, deep greenish brown; appearance, shining and resinous; fracture, glassy; powder, lively *greenish-yellow color.*

Remarks. The above are the principal kinds of aloes; but there are several other common sorts, as the Mocha, Caballine, and Indian, all of which are melted and doctored up by the conscientious druggist, and sold for Barbadoes and hepatics. They may, however, be readily distinguished by an experienced person, by their odor and appearance, which are widely different.

ALOES, STRAINED. *Syn.* MELTED ALOES. ALOE COLATA. *Oper.* I. Melt aloes in a copper pan by the heat of a steam or water-bath, then press them through a strong hair or wire sieve.

II. Melt the aloes as above, but with the addition of about twice their weight of water, strain and evaporate.

Remarks. Mocha and other common aloes, treated in this way and colored, are frequently sold for *melted* socotrine and hepatics. The coloring employed is usually the precipitated carbonate of iron (sesquioxide) or Venetian red, in fine powder, and sometimes a little annatto. The imposture is not readily detected by mere inspection by any one unaccustomed to these matters, hence the impunity with which the fraud is perpetrated. The object in melting aloes is to deprive it of the foreign matters, which it generally contains in large quantities, as sand, leaves, pieces of wood, &c. The action of the heat drives off much of the nauseous smell from the commoner kinds, at the same time that it deepens their color and renders their appearance more translucent and resinous, and hence disguises their original nature. The operation of melting aloes on the large scale, is usually carried on at *night,* in consequence of the nauseous fumes evolved, which may be smelt at a great distance.

ALOETIC ACID. This acid exists in a watery solution of aloes. Trommsdorf supposed it to be the gallic acid, but Dr. Pereira regards it as a distinct principle. Gallic acid gives a blue color with the persalts of iron, but infusion of aloes produces an olive brown one. (Pereira.) *Prep.* It is prepared by adding diacetate of lead to an infusion of aloes, and decomposing the precipitate with sulphureted hydrogen. *Remarks.* This acid must be distinguished from polychromic, chrysammic, and other acids produced from aloes by the action of nitric acid.

ALTERATIVES. (From the Latin *altero,* I change.) Medicines that establish the healthy functions of the body, without producing any sensible evacuation, by perspiration, vomiting, or purging. Small doses of the preparations of mercury are among the most useful and generally employed alteratives. Various formulæ for alterative medicines will be found in this work.

ALTHIONIC ACID. Discovered by Regnault in the residual liquor from the preparation of olefiant gas, from alcohol, and oil of vitriol.

Prep. Dilute with water and neutralize with hydrate or milk of lime. Decant the solution, which contains althionate of lime, evaporate and crystallize. Dissolve the crystals in water, and precipitate with oxalic acid; the solution is dilute althionic acid.

Prop. A sour liquid, forming salts, called althionates, with the bases, which have the same composition as the sulpho-vinates; they are, however, distinct salts. (Regnault and Ettling.)

ALUM. *Syn.* LUMP ALUM. ROCK ALUM. SULPHATE OF ALUMINA AND POTASH. ALUMEN, (*Lat.;*) ALUN, (*Fr.;*) ALAUN, (*Ger.;*) ALUIN, (*Dut.*) A salt composed of alumina, potassa, and sulphuric acid, and in its usual state, a large quantity of combined water.

Manufact. The principal alum works in England are near Paisley and Whitby. The minerals from which it is procured are called aluminous slate, shale, or schist, and frequently alum ore. *Proc.* The ore, placed in heaps and moistened from time to time with water, becomes gradually hot, and falls into a pulverent state. When it does not possess this property, by mere exposure to air and moisture, it is broken into pieces and laid

upon a bed of brushwood and small coal, to the depth of about 4 feet, when the pile is fired, and fresh lumps of alum rock thrown on, until the mass becomes of considerable height and size; the combustion is then conducted with a smothered fire, until the calcination is complete. The pile is then allowed to cool, and further exposed to the action of air and moisture. The residuum of the burning is now placed in large stone cisterns, and thoroughly edulcorated with water, until all the soluble portion is dissolved; the solution is then concentrated in another stone cistern, so made that the flame and heated air of its reverberatory furnace sweep the surface of the liquor. The evaporation is continued until it is *near* the point, but *somewhat weaker* than that at which it would deposite crystals on cooling; it is then run off, after defecation, into other cisterns, and solution of common muriate or sulphate of potassa, or (sometimes) impure sulphate or carbonate of ammonia, is added until a cloud or milkiness ceases to be produced on adding more; it is then allowed to settle and get thoroughly cold, and the supernatant mother liquor being drawn off with a pump or syphon, the precipitate is well drained. It is next well washed by stirring it up with a little *very cold water*, which after draining off, the operation is repeated a second time. A saturated solution of the alum is then formed in a leaden boiler, and the clear portion is run off, while boiling hot, into crystallizing vessels, called "*roaching casks*," from which it is taken, after the lapse of about a week, in the form of large crystalline masses, which are broken up and packed in casks for sale.

Remarks. The above is an outline of the most approved mode of making the alum of commerce. It has lately, however, been made at some chemical works on the banks of the Tyne, by the direct combination of oil of vitriol with a pure aluminous clay, the potash being afterwards added. This is a revival of the method first adopted by Chaptal. A *patent alum* is manufactured at the same works, which contains *no alkali*, and is, consequently, preferable for dyeing, as it is the alumina alone that forms the valuable ingredient in alums. Salts having the same general appearance and behavior as common alum, may be made by replacing the sulphate of potassa in the common alum, by ammonia or soda. Such compounds are known as ammonia and soda alum. The best sort of alum is formed when potassa alone has been employed in its manufacture. Good alum contains about 11 per cent. of alumina, 10 per cent. of potassa, 33 of sulphuric acid, and 46 of water.

Uses, &c. Alum is used in large quantities in many manufactories; added to tallow, it renders it harder; printers' cushions, and the blocks used in the calico manufactory, are rubbed with burnt alum to remove any greasiness, which might prevent the ink or color from sticking. Wood, sufficiently soaked in a solution of alum, does not easily take fire; and the same is true of paper impregnated with it, which is fitter to keep gunpowder, as it also excludes moisture. Paper impregnated with alum is useful in whitening silver, and silvering brass without heat. Alum mixed in milk helps the separation of its butter. If added in a very small quantity to turbid water, in a few minutes it renders it perfectly limpid, without any bad taste or quality; while the sulphuric acid imparts to it a very sensible acidity, and does not precipitate so soon, or so well, the opaque earthy mixtures that render it turbid, as I have often tried. It is used in making pyrophorus, in tanning, and many other manufactures, particularly in the art of dyeing, in which it is of the greatest and most important use, by cleansing and opening the pores on the surface of the substance to be dyed, rendering it fit for receiving the coloring particles, (by imparting alumina to the stuff,) and in this way making the color fixed. Crayons generally consist of the earth of alum, finely powdered, and tinged for the purpose. *In medicine* alum is used as a tonic and stringent, in doses of 5 to 20 grs.; as a gargle, (ʒj to ½ pint of water;) and as a collyrium and injection, (10 to 15 grs. to 6 oz. of water.) In lead colic, ʒss to ʒij of alum dissolved in gum water, every 3 or 4 hours, is said to be infallible. Powdered alum is frequently applied with the tips of the fingers, in cases of sore throat and ulcerations of the mouth, &c.

Pur. The usual impurity which renders alum unfit for the uses of the dyer, is the ferro-sulphate of potassa, but if iron be present in any other shape, it is equally injurious. Common alum frequently contains ammonia, from urine or the crude sulphate of the gas-works, having been employed in its manufacture. This may be detected by adding a little quicklime or caustic potassa. Powdered alum is commonly adulterated with large quantities of common salt, when its solution may be tested as described for muriatic acid and the muriates. Pure alum should form a colorless solution with water, and give a white precipitate with pure potassa soluble in an excess of the latter. It should suffer no change on the addition of tinct. of galls, prussiate of potash, or sulphureted hydrogen.

Ant. When excessive doses of alum have been taken, an emetic of sulphate of zinc should be given immediately, followed by copious draughts of warm water, and as soon as the vomiting ceases, give a purgative.

ALUM, BURNT. *Syn.* Dried Alum. Alumen ustum. Alumen siccatum. A. exsiccatum. *Proc.* Liquefy alum in a shallow earthen vessel over the fire, then cautiously raise the heat until ebullition has ceased. (P. L.)

Remarks. It is better to take *more time*, than to employ *too much* heat, lest a portion of the acid be driven off as well as the water. *Use.* Similar to common alum, but less soluble; dose 10 to 20 grs. in colic; it is used as an escharotic to burn down proud flesh, &c.

ALUM, IRON. *Prep.* Mix the solution of sulphate of potassa with a solution of tersulphate of peroxide of iron, and crystallize by spontaneous evaporation.

Remarks. This salt for the most part resembles common alum. It has *sometimes* a slight pink color. In a similar way may be made chrome and manganese alums. In all these salts ammonia may be substituted for potassa, with similar results.

ALUM, ROACH. *Syn.* Roman Alum. Turkey Alum. Red Alum, &c. A very pure sort of alum, imported from Roccha in Syria, and Tolfa in Italy, covered with an efflorescence of a palish

red or rose color. The article generally met with in commerce under this name is, however, nothing but common English alum, broken into pieces about the size of almonds, and colored with a little bole or rose pink. This is done by shaking the fragments in a sieve over a vessel of hot water, and then stirring them up with the color, until the surface is uniformly tinged therewith. In the genuine roach alum, the color not only covers the surface, but also partially pervades the substance of the crystals.

ALUM, WHEY. *Prep.* Boil ½ oz. of alum with a pint of milk, and strain it. *Use.* A wine-glassful in diarrhœa two or three times daily.

ALUMINA. *Syn.* Pure Alumine. Oxide of Aluminum. Magistery of Alum. Aluminous Earth. Earth of Alum. Argil, &c. This substance is the base of the common alum, just described, and is about one of the most abundant productions of nature. It forms a large proportion of the clay out of which bricks, pipes, and earthenware are manufactured, and in a pure and crystallized state, constitutes the ruby and sapphire, two of the hardest and most valuable of the gems.

Prep. I. Dissolve alum in 6 times its weight of boiling water, add a solution of carbonate of potassa, (in slight excess,) agitate for a few minutes, filter and wash with distilled water. To render this *perfectly* pure, it must be dissolved in weak muriatic acid, and again thrown down with ammonia, washed with water, and exposed to a white heat in a crucible. (Berzelius.)

II. Precipitate a solution of alum with a solution of chloride of barium, filter, evaporate to dryness, and ignite the residuum. (Liebig.)

III. Expose perfectly pure ammonia alum to a white heat. (Gay Lussac.)

Remarks. It is necessary to employ perfectly pure alum to prevent the product being vitiated. The third is the simplest process, where pure ammonia alum can be got; but as this is seldom the case, the second should be used in preference to the first. The hydrate of alumina, in the moist state, is used to mix with oxide of cobalt, and several other substances, as a base for the color. In this form it is sometimes called gelatinous alumina.

ALUMINA AND ITS SALTS, TESTS FOR. 1. Ammonia and the alkaline carbonates separate a bulky white powder (hydrate of alumina) from its solutions in the acids. 2. Pure potassa and soda throw down a white powder, soluble in excess of the precipitant. 3. Phosphate of ammonia gives a white precipitate. 4. Iodide of potassium causes a white precipitate, passing into a permanent yellow. 5. At a strong red heat its salts part with some of their acid. 6. Neither oxalate of ammonia, tartaric acid, prussiate of potash, nor tincture of galls, disturb their solutions. 7. Bisulphate of potash, added to concentrated solutions, gives a precipitate of octohedral crystals of alum. (See the article Bread.)

ALUMINA, ACETATE OF. *Prep.* I. Add a solution of acetate of baryta to another of sulphate of alumina.

II. (*Calico printer's mordant.*) *Prep.* Add 100 parts of alum to 120 parts of sugar of lead, each being first dissolved separately in hot water, and allowed to cool before mixing; decant the clear liquor.

Prop. Very soluble in water; astringent; by evaporation, it may be procured as a gummy mass but much heat decomposes it. *Use.* In calico printing as a mordant, mixed with starch or gum to thicken it. In dyeing, as a mordant, the thickening being omitted. Its valuable properties depend upon the feeble affinity existing between its constituents, which is counterbalanced by that of the cotton fibres at a moderate heat. Chemically pure acetate of alumina is made by the first formula, or by dissolving the fresh hydrate in concentrated acetic acid. The dyer's mordant, made like No. II., contains much sulphate of potassa, which is necessary for its proper action on the cloth.

ALUMINA, SULPHATE OF. *Syn.* Tersulphate of Alumina. *Prep.* Saturate dilute sulphuric acid with the freshly precipitated hydrate, evaporate, and crystallize.

Remarks. Crystallizes with difficulty. The disulphate falls down from its solution when ammonia is added. The mineral called aluminite, found near Newhaven, in Sussex, and other places, is a disulphate of alumina.

ALUMINUM. *Syn.* Aluminium. The metallic base of alumina; discovered by Davy. The following is Wohler's method of obtaining this metal.

Prep. Make a thick paste of alumina, powdered charcoal, sugar, and oil, and heat it in a covered crucible until all the organic matter is destroyed; then transfer the product to a porcelain tube, and connect the one end with another tube containing dried muriate of lime, and the other end with a small tubulated receiver. Then expose the porcelain tube to the heat of a small oblong furnace, and having connected the muriate of lime tube with a vessel disengaging chlorine, pass the gas through the apparatus, at the same time raising the heat of the tube to redness. In one or two hours, or as soon as the tube becomes choked, the whole must be allowed to cool, and taken to pieces, and the chloride of aluminum thus formed collected. 9 or 10 pieces of potassium, of about the size of peas, are then to be placed in a platina crucible, and upon them an equal number of similar pieces of the sesquichloride of alumina, formed as above; the cover is now to be put on and secured in its place with a wire, and the heat of a spirit lamp cautiously applied, until the spontaneous incandescence of the matter ceases. When cold, throw the crucible into a large vessel of cold water, agitate and collect the gray powder deposited, and again wash it well and dry it.

Prop. A gray powder, consisting of small metallic scales, resembling platina. It is not acted on by cold water, but is dissolved by the alkalis and some of the acids. Heated to redness, it catches fire and burns with great rapidity in the air, and in oxygen gas, with intense brilliancy. The powder, blown upon the flame of a candle, displays an immense number of inflamed points of great splendor. When heated to redness in the vapor of phosphorus, it burns vividly, and produces *sesquiphosphoret of aluminum.* When mixed with selenium and exposed to heat, a blackish powder, or *seleniuret of alumina,* is formed. When heated until strongly incandescent, and small pieces of sulphur dropped upon its surface, the most brilliant

combustion ensues with the formation of the *sesquisulphuret*. Both this and the last article possess a semi-metallic lustre, and are easily decomposed by exposure and moisture. Should any of the chloride remain unconsumed, it may be preserved in naphtha.

AMADOU. This word is derived from the French, and is applied to a spongy, combustible substance, made from a species of mushroom, (the boletus igniarius,) which grows on the trunks of some old trees.

Collect. and prep. It should be collected in the months of August and September, and the outer bark having been removed with a knife, the inner spongy light-brown substance must be carefully separated from the woody part below. It must be next cut into slices and well beaten with a hammer or mallet, until they become soft and easily pulled to pieces between the fingers. It is now fit for use.

Uses, &c. It is used for stopping bleeding and some other surgical purposes. When covered with resin plaster, it forms an excellent article for the protection of abraded surfaces in exposed situations, and a small piece thus prepared, of a circular shape, having a round hole cut in the middle, the size of the apex of the corn, forms the very best corn-plaster, as from its great softness it at once protects the part from pressure, and removes the cause. It is also used to make a match or tinder.

AMADOU TINDER. *Syn.* Boletus Tinder. German Tinder. Spunk. Touchmatch. Touchwood. *Prep.* I. Boil the prepared amadou in a strong solution of saltpetre, dry and beat it well with a mallet, then again soak it in the solution, dry and rub out the excess of saltpetre.

II. Make a thin paste with gunpowder and water, to which a little spirit may be added, then thoroughly imbue the prepared amadou with it; dry, beat out the loose powder, and again rub it with the paste; lastly, dry and rub out the loose matter.

Remarks. From the color of the last tinder, it has received the name of black spunk; the former is the most cleanly, the last the most combustible. The former is sometimes called red amadou. It is much used as a touchmatch, and instead of tinder, especially on the continent, where most smokers, prior to the general use of congreves, carried a box with them containing a little amadou and a small flint and steel.

AMALGAMS. (From ἅμα, together, and γαμεῖν, to marry.) Substances formed by mixing quicksilver with another metal. Alloys containing quicksilver. *Remarks.* Mercury unites with most of the metals by mere contact, forming amalgams. These are employed for various purposes in the arts, as silvering, gilding, coating mirrors, &c. (See the following Articles.)

AMALGAM, AMMONIACAL. This is a compound of mercury, hydrogen, and nitrogen, produced by placing a globule of metallic mercury in a small cavity, formed in a piece of sal ammoniac; the negative pole of a powerful voltaic battery is then brought in contact with the metal, and the positive pole with the ammoniacal salt. After a few seconds an amalgam of a ramified shape, and of the consistence of soft butter, is formed. On withdrawing the influence of the battery, the whole returns to its former condition. 2. By putting an amalgam of mercury and potassium into the moistened cavity of the sal ammoniac, similar results ensue. *Remarks.* The phenomena attending the formation of this amalgam have been brought forward to prove the compound nature of nitrogen and the existence of the theoretical base ammonium.

AMALGAM, ELECTRICAL. *Ing.* Zinc and tin, 1 oz. each; quicksilver, 2 oz. *Proc.* Melt the first two in an iron ladle, then withdraw it from the fire and add the mercury also, made hot; stir well together with an iron rod, pour the melted metal into a wooden box, and shake it violently until cold. It should be preserved in a corked glass vial.

Use For covering the cushions of electrical machines, for which purpose, a little must be poured out on a piece of clean paper, crushed quite smooth with a flat knife, and then spread thinly on the surface of the rubber, previously touched over with a little tallow.

AMALGAM OF GOLD. *Prep.* Place one part of gold in a small iron saucepan or ladle, perfectly clean, then add 8 parts of mercury, and apply a gentle heat, when the gold will dissolve; agitate the mixture for one minute, and pour it out on a clean plate or stone slab.

Use. For gilding brass, copper, &c. The metal to be gilded is first rubbed over with a solution of nitrate of mercury, and then covered with a very thin film of the amalgam. On heat being applied, the mercury volatilizes, leaving the gold behind.

Remarks. A much less proportion of gold is often employed than the above, where a very thin and cheap gilding is required, as by increasing the quantity of the mercury, the precious metal may be extended over a much larger surface. A similar amalgam prepared with silver is used for silvering.

AMALGAM FOR MIRRORS, &c. *Ing.* Lead and tin of each 2 oz.; bismuth 2 oz.; mercury 4 oz. *Proc.* Add the mercury to the rest in a melted state and removed from the fire; mix well with an iron rod.

Uses, &c. This amalgam melts at a low heat, and is employed for silvering the insides of hollow glass vessels, globes, convex mirrors, &c. The glass being well cleaned, is carefully warmed, and the amalgam, rendered fluid by heat, is then poured in, and the vessel turned round and round, so that the metal may be brought in contact with every part of the glass, which it is desired to cover. At a certain temperature this amalgam readily adheres to glass.

AMBER. *Syn.* Succinum (*Lat.*); Succin (*Fr.*); Bernstein (*Ger.*) A yellow semi-transparent, vegeto-mineral substance, somewhat resembling copal, much used for the manufacture of trinkets, mouth-pieces for pipes, &c. It is found upon the coasts of the Baltic Sea, Sicily, Poland, Saxony, Siberia, Greenland, &c.

Remarks. The finer sorts of amber fetch very high prices. A piece of a pound weight is said to be worth from 10*l.* to 15*l.* 5000 dollars were lately offered in Prussia for a piece weighing 13 lbs., and which, it was stated by the Armenian merchants, would fetch from 30 to 40,000 dollars in Constantinople. It would thus appear to be more valued

in the east than in England. In the royal cabinet, Berlin, there is a piece weighing 18 lbs., and supposed to be the largest ever found. The coarser kinds are employed in medicine, chemistry, and the arts.

Identity. Amber may be known from mellite and copal, both of which articles are occasionally substituted for it, by the following characteristics. 1. *Mellite* is infusible by heat, and burns white. 2. A bit of copal, heated on the point of a knife, catches fire, and runs into drops, which flatten as they fall. 3. Amber burns with spitting and frothing, and when its liquefied particles drop, they rebound from the plane on which they fall. (M. Haüy.)

AMBER IS JOINED AND MENDED by smearing the surfaces of the pieces with linseed or boiled oil, and then strongly pressing them together, at the same time holding them over a charcoal fire, or heating them in any other way in which they will not be exposed to injury.

AMBER IS WORKED in a lathe, polished with whiting and water or oil, and finished off by friction with flannel. During the operation the pieces often become hot and electrical, and fly into fragments, to avoid which, they should be kept cool, and only worked for a short period at a time. The workmen are said to suffer considerably from electrical excitement, often experiencing severe nervous tremors of the hands and arms.

AMBER, FACTITIOUS. *Prep.* Dissolve shellac in an alkaline lye, then pass chlorine through the solution until the whole of the lac is precipitated. After washing in water, this must be melted and kept over the fire until it runs *clear*, taking care that it does not burn; it should then be poured into moulds of the size of the pieces required.

Remarks. The darkest and hardest pieces of copal are also often substituted for amber. The above operation requires considerable management. (See CHLORINE and GAS.)

AMBER, SOLUBLE. *Prep.* Heat the amber cautiously in an iron pot, over a clear fire, until it softens and becomes semi-liquid; then add pale boiled linseed oil, heated very hot, and well mix it in by stirring. The best proportions are 3 lbs. of oil to 4 lbs. of amber.

Uses, &c. In this state, on being cooled a little, it may be made into a varnish by the addition of oil of turpentine; or it may be preserved for any length of time if covered from the air, and is always ready for the above purpose on being gently heated. It is sometimes used as a cement for glass and earthenware, by rubbing it on the edges of the broken piece, previously heated. Amber is soluble in sulphuric acid and the pure alkalis, but neither of these solutions can be used in the arts. The previous method is that followed by the varnish-makers.

AMBER, TO IMPROVE. There are two methods practised by the workman to harden common amber, and to render it clearer. *Oper.* I. Boil the pieces of amber in rape oil for 24 hours. II. Surround the amber with clean sand in an iron pot, and expose it to a gradually increasing heat for 30 or 40 hours. During this process pieces must be kept in the sand at the side of the pot, for the purpose of occasional examination, lest the heat be raised too high, or be too long continued. *Remarks.* The second process is said to require much skill and experience for its successful performance.

AMBER, CAMPHOR. *Syn.* CRYSTALLINE PYRETINE. VOLATILE RESIN OF AMBER. This substance is obtained as a yellowish light sublimate towards the end of the process of the destructive distillation of amber in close vessels; it comes over after the last portion of the oil, and is found in the neck of the retort.

AMBER VARNISH. *Prep.* Amber 1 lb.; pale boiled oil 10 oz.; turpentine 1 pint. *Proc.* Render the amber, placed in an iron pot, semi-liquid by heat; then add the oil, mix, remove it from the fire, and when cooled a little, stir in the turpentine.

II. To the amber, melted as above, add 2 oz of shellac, and proceed as before.

Remarks. This varnish is rather dark, but remarkably tough. The first form is the best. It is used for the same purposes as copal varnish, and forms an excellent article for covering wood, or any other substance not of a white or very pale color. It dries well, and is very hard and durable.

AMBER VARNISH, BLACK. *Prep.* Amber 1 lb.; boiled oil ½ pint; powdered asphaltum 6 oz.; oil of turpentine 1 pint. *Proc.* Melt the amber, as before described, then add the asphaltum, previously mixed with the cold oil, and afterwards heated very hot, mix well, remove the vessel from the fire, and when cooled a little add the turpentine, also made warm.

Remarks. Each of the above varnishes should be reduced to a proper consistence with more turpentine if it be required. The last form produces the *beautiful black varnish* used by the coach-makers. Some manufacturers omit the whole or part of the asphaltum, and use the same quantity of clear black rosin instead, in which case the color is brought up by lampblack reduced to an impalpable powder, or previously ground very fine with a little boiled oil. The varnish made in this way, lacks, however, that richness, brilliancy, and depth of blackness imparted by asphaltum.

AMBERGRIS. *Syn.* AMBERGRISEA (*Lat.*) AMBREGRIS (*Fr.*) A substance found in irregular masses floating on the sea in tropical climates, and supposed to be a morbid secretion of the liver or intestines of the spermaceti whale. *Prop.* Dirty pale color; very odorous; lighter than water; largely employed in perfumery. *Pur.* From its high price (about 21s. per oz. retail) it is frequently adulterated with cheaper matter. When quite pure it is nearly or wholly soluble in hot ether and alcohol, and yields about 85% of ambreine. Its sp. gr. should not exceed ·926 nor be less than ·780. It should adhere to the edge of a knife when scraped, and should yield to the pressure of the nails. It melts at 144°, and flies off as a white vapor at 212°. It should burn with an agreeable odor, and leave no notable quantity of ashes. It is frequently adulterated with gum benzoin, labdanum, farina, meal, &c., mixed together, and scented with musk. *Dose, &c.* It has been given in doses of 3 to 10 grs. as an aphrodisiac.

AMBERGRIS, FACTITIOUS OR REDUCED. An article is sold of this description, which is made in the following way. *Prep.* Ben nuts 6 oz.; spermaceti 8 oz.; gum benzoin 20 oz.; or-

ris powder 16 oz.; starch 8 oz.; asphaltum 3 oz.; mucilage of gum tragacanth q. s.; good grain musk 1 oz.; genuine ambergris 8 oz.; liquor of ammonia 1 oz. *Proc.* Beat to a perfectly homogeneous mass, make it up into lumps, and dry.

Remarks. This article is readily distinguished from genuine ambergris by its imperfect solubility in alcohol.

AMBREINE. *Syn.* AMBREINA. ODOROUS PRINCIPLE OF AMBERGRIS. *Prep.* Digest ambergris in hot alcohol of 0·827 until the latter will dissolve no more, then filter. The ambreine will be deposited on cooling, in an irregular crystalline mass. It may be purified by resolution.

Prop. White, smells of amber, and is often advantageously substituted for that substance in perfumery. Melts at 86°; volatilizes at 212°. Nitric acid converts it into ambreic acid. This acid combines with the bases, and resembles cholesteric acid.

AMIDINE. A substance found in starch paste that has been long exposed to the atmosphere, and also formed immediately by the action of hot water. (Saussure, Caventou.) Its properties are intermediate between those of starch and gum.

AMILENE. *Prep.* When the oil of potato spirit is repeatedly distilled with anhydrous phosphoric acid, an ethereous liquid, possessing a peculiar aromatic odor, is obtained, which has been called amilene by Cahours.

AMMELIDE. A white powder, possessing some peculiar properties, discovered by Liebig. *Prep.* It is prepared by dissolving melam, melamine, or ammeline, in strong sulphuric acid, adding alcohol, and washing the precipitate with cold water. It is purified by resolution in dilute nitric acid, and precipitation by carbonate of ammonia.

AMMELINE. *Prep.* Dissolve melam in boiling dilute muriatic acid, evaporate and crystallize. Dissolve the crystals in pure water, and precipitate with ammonia. *Remarks.* A weak alkaline base, discovered by Liebig. It consists of very fine needles, having a silky lustre.

AMMONIA. *Syn.* VOLATILE ALKALI. ALKALINE AIR. GASEOUS AMMONIA. AZOTURETED HYDROGEN. Pure ammonia is an incondensable colorless gas, possessing great pungency and acridness, and powerful alkaline properties. Water readily absorbs about 500 times its volume of this substance, and in this state forms strong liquid ammonia, which, when much more dilute, is popularly known as spirits of hartshorn, or water of ammonia. As usually met with in the form of a semi-crystalline whitish mass, commonly called smelling salts, it is combined with carbonic acid and water, forming a sesquicarbonate of this base.

Hist., Sources, &c. Ammonia, in combination with acids, is frequently found ready formed in nature; but that met with in commerce is an artificial production. It is found, in variable quantities, among the saline product of volcanoes, in sea water, in bituminous coal, and in the atmosphere, especially that of large towns. The minute stellated crystals sometimes found on dirty windows in London and other populous cities consist of sulphate of ammonia. (Brande.) Ammonia was originally brought from Egypt, where it was obtained by sublimation, under the form of sal ammoniac, from the soot produced by burning camel's dung. It was afterwards procured from putrid urine by distillation; but at the present day it is chiefly prepared from the ammoniacal liquor of the gas-works, and the manufactories of ivory black, animal charcoal, &c. In these places a larger quantity of crude ammoniacal liquor is obtained, to which either sulphuric or muriatic acid is added, by which it is converted into a salt, which may be obtained nearly pure by evaporation, crystallization, and subsequent sublimation Other processes have been adopted for the preparation of the principal salts of ammonia, viz., its sulphate, carbonate, and muriate, some of which have been patented, but none of these have got into general use.

Prep. Mix unslaked lime with an equal weight of sal ammoniac, both dry and in fine powder; introduce the mixture into a glass retort, and join the beak by a collar of Indian rubber to a glass tube about 18 inches long, which must lie horizontally, and have its beak bent up ready to be placed under a glass jar, on the shelf of a mercurial pneumatic trough. Heat being applied by means of a spirit-lamp, and the air contained in the apparatus having been expelled, the gas may be collected for use. Ammonia cannot be dried by means of muriate of lime.

Use. It is employed in several chemical processes; absorbed by water it forms liquor of ammonia, spirits of hartshorn, &c., which see.

Tests and Char. Ammonia is easily recognised by—1. Its pungent odor. 2. By turning vegetable blues green and yellows brown, but which soon regain their previous colors, especially on the application of heat. 3. By producing dense white fumes when brought in contact with those of muriatic acid, as for instance, by holding the stopper moistened with the latter over the former. *The salts of ammonia* may be known by the following properties:—1. The exhalation of ammoniacal gas (recognised by its odor) when mixed with caustic potassa, or soda. 2. Dropped into a solution of chloride of platinum, they produce a yellow precipitate. They are mostly *soluble in water, volatile*, and crystallizable.

Estimation. This is usually performed by putting a given weight of the sample into a small retort, the end of which is made to dip into a vessel containing dilute muriatic acid. A strong solution of caustic potassa is then poured into the retort, and heat applied by means of a small spirit lamp. When all the ammonia is distilled over, the acid solution must be evaporated to dryness and weighed, and from the quantity of the muriate thus found, the weight of pure ammonia will be known; 54 parts of the former being equivalent to 17 of the latter. If the article for examination be a solid substance (as a salt) it may be dissolved in water or dilute acid before being put into the retort.

AMMONIA, ACETATE OF. *Prep.* I. Mix together equal parts of sal ammoniac and acetate of potassa, and distil; binacetate of ammonia passes over into the receiver, as an oily liquid, which on cooling forms a radiated crystalline mass. By passing dry ammoniacal gas into this salt, melted by a gentle heat, it is transformed into the neutral acetate, and becomes solid and inodorous.

II. By saturating strong acetic acid with am

monia, and evaporating over sulphuric acid in vacuo, crystals of acetate of ammonia may be obtained.

Prop. Very soluble both in alcohol and water; very deliquescent.

AMMONIA, ACETATE, SOLUTION OF. *Syn.* MINDERUS SPIRIT. LIQUID ACETATE OF AMMONIA. WATER OF ACETATE OF AMMONIA. *Prep.* Saturate distilled vinegar with carbonate of ammonia.

Proportions.

	Sesquicarbonate of ammonia.	Distilled vinegar.
Lond. Ph. .	℥ivss	4 pints.
Edin. " .	℥j	f℥xxiv (s. g. 1·005)
Dub. " .	1 part.	about 30 parts.

Prop. Colorless; taste slightly urinous; neutral to litmus and turmeric paper; when concentrated by heat and mixed with oil of vitriol, it emits the fumes of vinegar, and those of ammonia, when mixed with caustic alkali or liquor of potassa in excess.

Use, Dose, &c. It is a very common febrifuge and diaphoretic, and an excellent *aperient* saline liquor. Taken warm in bed, it generally proves a powerful *sudorific;* and as it operates without heat, it is used in febrile and inflammatory disorders, where medicines of the warm kind, if they fail of producing sweat, aggravate the disease. Its action may likewise be determined to the kidneys, by walking about in cool air. The common dose is half an ounce, either by itself or along with other medicines adapted to the intention. Externally it is frequently used as a collyrium in chronic ophthalmia: 1 oz. to 9 oz. of water.

Remarks. It is very necessary to avoid an excess of ammonia, as its presence would prove in many cases injurious, especially in eye-waters. *A very trifling* excess of acid is preferable. The point of saturation is known by the effervescence becoming feeble on adding more ammonia, and the liquor being neutral to turmeric and litmus paper.

AMMONIA, SOLUTION OF ACETATE OF, (CONCENTRATED.) *Prep.* Saturate acetic acid, sp. gr. 1·038, with sesquicarbonate of ammonia in powder; about 2½ lbs. of the latter to 1 gallon of the former.

Remarks. The same precautions are necessary to produce a neutral solution as in the previous article. This article has a great demand in the wholesale drug trade, under the name of concentrated liquor of acetate of ammonia, (liq. ammon. acet. conc.) It is very convenient for dispensing. fʒj added to fʒvij of water, forms the liquor ammoniæ acetatis of the L. Ph.

AMMONIA, ARSENIATE OF. *Prep.* Saturate a strong solution of *arsenic* acid with the liquor of sesquicarbonate of ammonia; evaporate and crystallize. *Remarks.* A binarseniate may also be formed by adding an excess of acid.

AMMONIA, ARSENITE OF. *Prep.* Dissolve sesquicarbonate of ammonia in a hot and strong solution of *arsenious* acid, until saturation is produced; evaporate as last. *Use.* To make the arsenite of iron. Its properties and action are similar to those of arsenite of potash.

AMMONIA, ARGENTO-CHLORIDE OF. *Syn* AMMONIO-CHLORIDE OF SILVER. *Prep.* Expose well-washed and freshly precipitated chloride of silver to the action of ammoniacal gas, by placing a small cup containing liquor of ammonia, in an evaporating basin containing the chloride, and covering the whole with a sheet of glass or writing paper. After the lapse of a few hours, digest the precipitate in liquor of ammonia, sp. gr. ·880, gradually applying a gentle heat until at length the water boils; then remove the flask from the fire and allow it to cool, when crystals will form. These must then be collected, washed with a little cold liquor of ammonia, and dried by pressure between blotting-paper. *Caution. This article should only be prepared in small quantities at a time, as a brown fulminating powder, of the most dangerous description,* is not unfrequently thrown down from the liquor, and has sometimes led to accidents.

AMMONIA, BENZOATE OF. *Prep.* Dissolve pure benzoic acid in strong liquor of carbonate of ammonia, until the latter is saturated, applying (cautiously) a gentle heat; cool and crystallize. *Uses, &c.* As a chemical reagent.

Remarks. When the solution is boiled for a short time, and abandoned to spontaneous evaporation, crystals of acid benzoate of ammonia are deposited.

AMMONIA, BIMALATE OF. *Prep* Add a strong solution of malic acid to another of neutral malate of ammonia; cautiously evaporate and crystallize. *Prop.* Large crystals; taste, acid and agreeably saline; very soluble in water.

AMMONIA, CARBONATE OF. *Syn.* SUBCARBONATE OF DITTO. SESQUICARBONATE OF DITTO. VOLATILE SAL AMMONIAC. BAKER'S SALT. VOLATILE SALTS. PREPARED AMMONIA. AMMONIÆ SESQUICARBONAS, (P. L. and E.) AMMONIÆ CARBONAS, (P. D.) CARBONATE D'AMMONIAQUE, (*Fr.;*) KOHLENSAURES AMMONIAK, (*Ger.*) This is the substance popularly known as "*smelling salts.*"

Prep. I. Sal ammoniac 1 lb.; dried chalk 1½ lb. *Proc.* Pulverize the ingredients separately, then mix and sublime with a gradually increasing heat, (L. and E. Ph.) *Remarks.* The above are the proportions of the London and Scotch Colleges; they are as 2 to 3. The D. Ph. directs equal quantities of dried carbonate of soda and sal ammoniac. On the large scale this salt is prepared as follows.

II. Sal ammoniac, or pure commercial sulphate of ammonia, and chalk, equal parts, both dry and in powder. Mix and sublime from an iron pot, into a long earthen or leaden receiver, well cooled.

Remarks. The receiver is usually fitted with a moveable lead cover, secured by a water joint, and has an open lead pipe in the bottom, to allow the liquid products of the distillation to drain off into a second receiver. When made of the *impure* sulphate of ammonia, it must be resublimed in iron pots, furnished with leaden heads kept cool. A little water is commonly introduced into the subliming pots, to render the product translucent The heat is usually applied by means of a common furnace, but a steam or water bath is preferable, as the temperature required for this purpose does not exceed 200° F.

In the above processes the salt is formed by the double decomposition of the ingredients, a muriate or sulphate of lime being left in the retort, and

carbonate (sesqui-) of ammonia passing over into the receiver. It is commonly called a carbonate, but it is properly a sesquicarbonate, containing 1½ atom of carbonic acid and 1 atom of ammonia, besides combined water. (Phillips, Rose, Thompson.) As it is usually met with, *its* composition is variable, owing to the action of the atmosphere, &c. The chemically pure carbonate of ammonia can only be prepared by bringing together perfectly pure and dry carbonic acid and ammoniacal gases. Such is the competition at present existing in the ammonia trade, that this salt may be bought of very fine quality at 5d. a pound, in quantity. *Prop.* Soluble in 4 parts of cold water; but boiling water and alcohol decompose it, with the evolution of carbonic acid gas. By age or exposure to air, the surface assumes an opaque white color, from a portion of the ammonia flying off, and the remainder being converted into a bicarbonate.

Tests and Char. It is recognised in the same way as ammonia, and it is known to be a carbonate by giving a white precipitate with chloride of barium.

Uses. Much used by bakers, especially in their fancy goods, and to make extemporaneous bread and pastry; and by the chemist and pharmaceutist for the preparation of many of the salts of ammonia. As a medicine it is stimulant, antacid, diaphoretic, and antispasmodic. *Dose.* 5 to 15 grs. in pills or solution, (in hysteria, dyspepsia, heartburn, or chronic rheumatism.) A plaster made of 1 part of powdered carbonate of ammonia, and 3 parts of extract of belladonna, and spread upon leather, is used for allaying rheumatic pains. Sesquicarbonate of ammonia is also used to make an effervescing saline draught.

20 grs. of sesquicarbonate of ammonia, in solution, should be used, to either—	f36 of lemon juice, 24 grs. of citric acid, or 25 grs. of tartaric acid.

With the addition of a few drops of any aromatic essential oil, as lavender, bergamotte, &c. It is much used as a smelling salt in cases of fainting, &c.

AMMONIA, CARBONATE. (SUPER, OR BICARBONATE.) *Prep.* (Dub. Ph.) Dissolve carbonate of ammonia in water, and pass a stream of carbonic acid gas through it, until effervescence ceases. Dry the crystals without heat, and preserve in stoppered bottles. (See CARBONIC ACID.) *Remarks.* After the ammoniacal solution is thoroughly saturated with gas, evaporation must be conducted with *a very gentle heat,* when small prismatic crystals will form, having neither smell nor taste.

Prop., Uses, &c. Similar to the sesquicarbonate, except being devoid of smell. *Dose.* 6 to 24 grains.

AMMONIA, CITRATE. *Prep.* I. (*Extemporaneous.*) Saturate lemon juice with carbonate of ammonia, about ʒj of the latter to f℥ij and ʒij of the former.

II. (*Crystals.*) Saturate a solution of pure citric acid as above; evaporate and crystallize, (about 7 parts of acid to 6 of sesquicarbonate of ammonia.)

Uses, &c. A solution of the crystals is employed as a chemical reagent; the 1st form is used as a mild saline aperient and diaphoretic in febrile disorders.

AMMONIA, CYANATE OF. *Syn.* UREA. *Prep.* Mix 28 parts of perfectly dry ferro-cyanide of potassium with 14 parts of black oxide of manganese, both pure and in fine powder; then place them on a smooth iron plate, and heat them to a dull red, over a charcoal fire. When the mass begins to burn, it must be frequently stirred; after which cool and dissolve in cold water, filter and add 20½ parts of dry sulphate of ammonia, and decant the clear from the precipitated sulphate of potassa. Concentrate at a heat below 212°, again decant, evaporate to dryness, and digest in boiling alcohol of 80%; crystals of urea will be deposited as the solution cools. (Liebig.) *Prod.* 4 oz. of perfectly colorless and beautifully crystallized urea, from 1 lb. of the ferro-cyanide of potassium.

AMMONIA, HYDROSULPHURET OF. *Syn.* HYDROSULPHATE OF AMMONIA. BOYLE'S FUMING LIQUOR. BEGUIN'S SULPHURETED SPIRIT. HEPATIZED AMMONIA. SULPHURET OF AMMONIA. *Prep.* Reduce 5 parts of sulphuret of iron to coarse powder, put it into a retort, and pour thereon 7 parts of sulphuric acid, diluted with 32 parts of water, and pass the gas evolved through 4 parts of the strong liquor of ammonia, applying a gentle heat towards the end of the process.

Remarks. This operation is best conducted in a Woolf's apparatus, putting into the first bottle a little water, into the second, the liquor of ammonia, and into the third, some milk of lime to absorb the superfluous gas, and prevent its escape into the apartment. *This gas* is sulphureted hydrogen, which is not only very fœtid, but poisonous.

Prop. The hydrosulphuret of ammonia, when quite pure, is a gaseous body, readily absorbable by water, forming a transparent solution. It is this gas which constitutes the nauseous effluvia evolved from privies, and decomposing animal matter. *Dose.* 5 drops and upwards, mixed with water, and instantly swallowed to prevent decomposition, in diabetes. It is principally employed by the chemist as a test liquor for metals.

Ant. When this liquid is swallowed in large doses it acts as a violent poison. Dilute solution of chlorine, or the chloride of lime or soda, followed by a powerful emetic, or the stomach-pump, are the best antidotes. When the gas has been respired, free exposure to fresh air, and copious affusions of cold water, with moderate draughts of brandy and water, and the use of the smelling-bottle, (ammoniacal,) should be adopted.

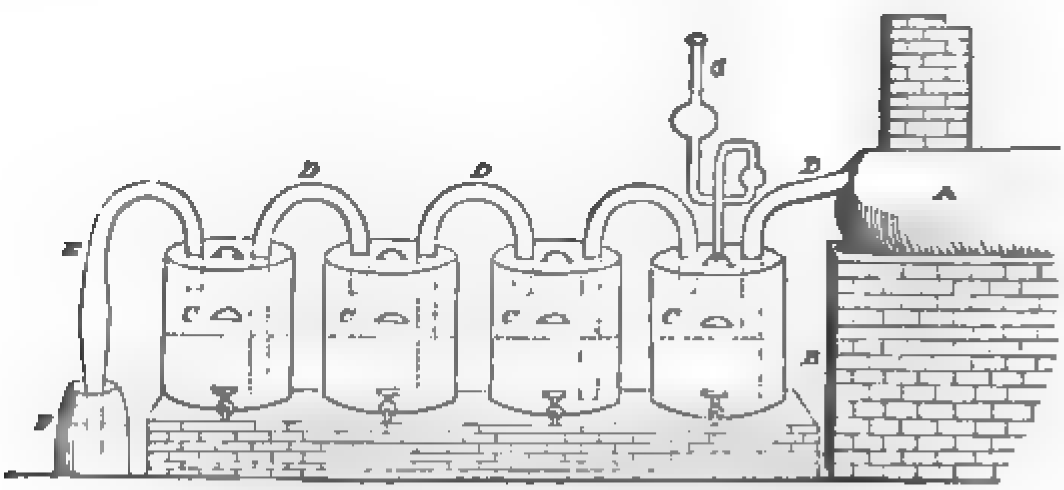
AMMONIA, LIQUOR OF. *Syn.* WATER OF AMMONIA. SOLUTION OF AMMONIA. WATER OF CAUSTIC AMMONIA. DISSOLUTION D'AMMONIAQUE (*Fr.*) LIQUORE DI AMMONIACO (*Ital.*) ATZENDER AMMONIUM-LIQUOR (*Ger.*) *Prep.* I. (*Liquor ammoniæ,* P. L.) *Ing.* Newly-burnt lime ℥viij; sal ammoniac, in small lumps ℥x; water 2 pints *Proc.* Put the lime into a retort and slake with a little water, then add the sal ammoniac, and the remainder of the water; distil f℥xv of the solution with a gradually increased heat into a *well-cooled* receiver. The sp. gr. should be 0·960.

II. (*Aqua ammoniæ fortior, and aqua ammon* P. E.) Both these articles are prepared by one process, by using a second receiver containing

double the quantity of water in the 1st. Sp. gr. 0·880 and 0·960. The proportions are equal parts of lime and sal ammoniac.

III. (*Aq. ammon. caustica.* D. Ph.) The specific gravity is 0·950.

IV. *On the commercial scale* this article is prepared from a mixture of about equal parts of quicklime and sal ammoniac, or sulphate of ammonia, which are heated together in an iron cylinder or retort, connected with a refrigerator, consisting of a row of stone bottles with double necks containing water, and kept very cold. The arrangement of this apparatus is represented below, which, with the accompanying references, will explain itself



A, Cylindrical Iron Retort.
B, Furnace for ditto.
C C C C, Stoneware Receivers.
D D D D, Connecting Pipes.
E F, Waste Pipe and Receiver.
G, Safety Tube

There are two methods of proceeding in mixing the ingredients: the one is to mix the dry ingredients together, and to drive over the dry gas into water; the other is first to slake the lime with a little water, then to add the sal ammoniac, and mix the whole to a pap before applying heat. In either case a proportionate quantity of water is put into the condenser, and the operation is nearly similar, but the latter method requires the least heat.

Remarks. Whatever form may be adopted to prepare liquid ammonia, it is absolutely necessary to keep the receivers as cool as possible for the purpose of promoting the absorption of the gas, and to prevent its loss. On the small scale the glass receivers or bottles should be surrounded with ice and furnished with a safety tube to prevent accidents. The water contained in the first bottle will be the strongest, if it be kept well cooled, and the others will progressively decrease in strength. By mixing the contents of one bottle with another, water of almost any strength may be made. This article is now seldom made by the druggist on the small scale, the large chemical manufactories supplying it at very low rates, and of very superior quality. In the shops, liquor of ammonia is kept of two or three strengths: one of a sp. gr. of ·880, for dissolving essential oils and filling smelling-bottles, &c.; another at 0·960, liq. of ammonia, P. L.; and a third about the strength of common spirits of hartshorn, for which it is sold. 1 measure of the first mixed with 3 measures of distilled water will make a water of about 0·970, and with only 2 measures of water, one of about 0·960. I have known the strongest sold so low as 9d. per lb., and the last at 1½d. *Caution.* It should be kept in well-stoppered bottles in a cool cellar.

Props., Uses, &c. Ammonia-water is stimulant, antacid, diaphoretic, and rubefacient. *Dose.* 5 to 20 drops, mixed with water. It is seldom used internally. It enters into the composition of several valuable external remedies, and is employed in many chemical operations.

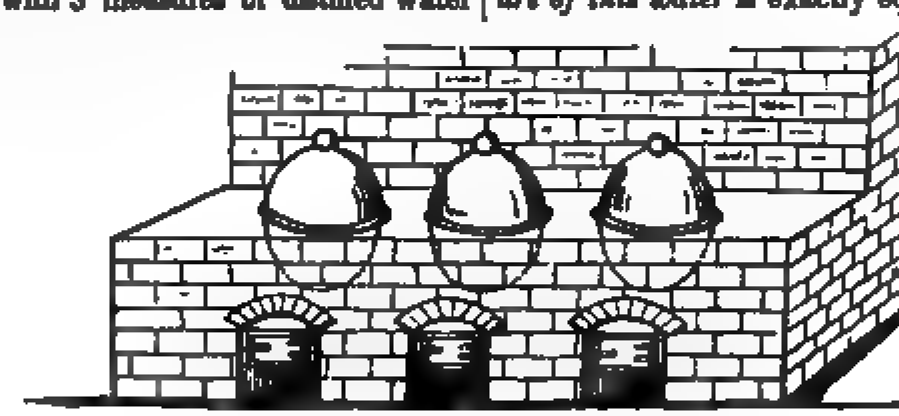
Pur. It should neither effervesce with acids, nor form a precipitate with lime, water, or chloride of calcium. When neutralized with nitric acid, neither nitrate of silver, oxalic acid, nor sesquicarbonate of ammonia, should produce any precipitate.

Ant. When the fumes have been inhaled, expose the patient to a current of fresh air, and when the liquid has been swallowed, administer vinegar or lemon-juice mixed with water.

Strength. The usual method of ascertaining the strength of liquid ammonia is by taking its specific gravity; before this is done, however, it is best to test it for its purity, as the presence of foreign matter will alter its density. (See ALKALIMETRY and AMMONIMETRY.)

AMMONIA, LIQUID, FOR TESTING. *Syn.* HENRY'S PURE AMMONIA WATER. *Prep.* Add distilled water to pure liquid ammonia, until its sp. gr. be exactly 0·970.

Use. For testing, in acidimetry, &c. *One measure of this water* is exactly equal to *one measure*



of sulphuric acid, sp. gr. 1·135; *one* measure of *nitric acid*, sp. gr. 1·143, and one measure of muriatic acid, sp. gr. 1·074. Useful in assaying waters.

AMMONIA, MURIATE OF. *Syn.* HYDROCHLORATE OF AMMONIA. SAL AMMONIAC. CHLORIDE OF AMMONIUM. CHLORO-AMIDIDE OF HYDROGEN. *Hist.* This substance is said to have been known to antiquity; it was formerly prepared in Egypt by the sublimation of the soot from camel's dung, which yields from ⅙ to ¼ its weight. (See AMMONIA.) The sal ammoniac of commerce is now wholly prepared at the great chemical works, and never by the small consumer, by whom it is merely occasionally refined or purified.

Prep. The crude ammoniacal salt of the gas-works is placed in iron pots, lined with clay, and a leaden dome or head adapted, and heat applied until the whole has sublimed. When the crude salt is a sulphate, it is mixed with a sufficient quantity of muriate of soda before sublimation, and the sal ammoniac is formed by the double decomposition of the ingredients. The preceding figure represents the arrangement of the pots and furnace, which was adopted a few years since at the Westminster gas-works.

The preparation of sal ammoniac from bone-spirit salt is nearly similar.

Prop. The sal ammoniac of commerce is found under the form of large hemispherical, cup-like cakes or masses, having a semi-crystalline texture, and varying in weight from 100 to 1000 lbs.

Use. It is much used in the arts, especially in the working of metals and in dyeing; it is also employed in large quantities to give a factitious pungency to snuff; in chemistry to form frigoric mixtures, &c., and in medicine, it is given as a diuretic, stimulant, and tonic. *Dose.* 5 to 20 grs. (combined with bark, in agues.) 1 oz. to half a pint of water forms a good chilblain lotion.

Pur. It forms a clear and colorless solution with water, and wholly volatilizes by heat. Mixed with lime or caustic potassa, it evolves the pungent odor of ammonia; it gives a white curdy precipitate with nitrate of silver.

Remarks. The sal ammoniac of commerce is generally sufficiently pure for all the purposes of the arts, but when wanted of greater purity, it may be broken into pieces and re-sublimed from an earthenware vessel into a large receiver of earthenware or glass, in which state it is known as "flowers of sal ammoniac," from being in fine powder. Chemically pure hydrochlorate of ammonia may be preparedby adding the pure carbonate of ammonia to dilute hydrochloric acid until saturated.

AMMONIA, NITRATE OF. *Syn.* NITRATE OF OXIDE OF AMMONIUM. NITRUM FLAMMANS. NITRUM SEMI-VOLATILE. *Prep.* Dilute nitric acid with 3 times its weight of water, then gradually add sesquicarbonate of ammonia in powder, to saturation; evaporate and crystallize.

Uses, &c. This salt is principally employed for the preparation of nitrous oxide, or laughing gas, of which nearly 3 cubic feet may be procured from 1 lb. (Davy.) It forms a very convenient "freezing mixture" with water, and may be used for this purpose any number of times by simply evaporating the solution to dryness, when the salt will be obtained unaltered, ready for another operation. *Dose.* 20 to 30 grs., as a febrifuge, but it appears worthless in this respect. *Remarks.* Nitrate of ammonia crystallizes in beautiful hexagonal prisms, when the process is conducted at a heat not exceeding 100° F., but at 212°, in long silky fibres or needles. When dried at 300°, it forms a compact white mass. The first is called *prismatic*, the second *fibrous*, and the third *compact* nitrate of ammonia.

AMMONIA, OXALATE OF. (AMMONIÆ OXALAS, P. E.) *Prep.* Oxalic acid ℥iv, water 4 pints, sesquicarbonate of ammonia ℥viij. *Proc.* Dissolve the acid in the water, then add the ammonia in powder; evaporate and crystallize.

Remarks. The above is the form of the Ed. Ph., but all that is required is to saturate a solution of oxalic acid with ammonia. It is used as a test for lime, with which it produces a white precipitate soluble in nitric acid.

AMMONIA, WATER OF OXALATE OF. *Prep.* Dissolve oxalate of ammonia in 10 or 12 times its weight of pure water. *Use.* As above.

AMMONIA, SUCCINATE OF. *Prep.* Saturate a solution of succinic acid with ammonia, (liq. or carb.,) evaporate and crystallize. *Use.* As a test for iron. It is said to be antispasmodic.

AMMONIA, SULPHATE OF. *Syn.* SULFAMIDE. SECRET SALT OF GLAUBER. SULPHATE OF OXIDE OF AMMONIUM. OXYSULPHION OF AMMONIUM. SECRET SAL AMMONIAC. AMMONIÆ SULPHAS. (*Lat.*) The manufacture of the crude sulphate has been already described; the pure salt is made as follows:

Prep. Saturate dilute sulphuric acid with ammonia; evaporate and crystallize.

Uses, &c. It is diuretic and aperient, but has been little used in medicine. *Dose.* 5 to 30 grains. The crude sulphate forms an excellent manure. (See MANURES.)

AMMONIACAL LAVENDER. *Syn.* AMMONIACAL ALCOHOLATE OF LAVENDER, (P. Cod.) *Prep.* Dissolve 1 oz. of English oil of lavender in 2 lbs. of spirits of ammonia. *Use.* Stimulant; as a scent in fainting.

AMMONIMETRY. *Syn.* AMMONIOMETRY. The operation by which the strength of liquid ammonia or ammonia water is determined.

Proc. The strength of liquid ammonia is best found from its specific gravity, which may be easily ascertained by an hydrometer, or sp. gr. bottle. (See SPECIFIC GRAVITY.) When the content of ammonia per cent. may be found by mere inspection of either of the following tables, or approximately by deducting the sp. gr. expressed in three integers from 998, and dividing the remainder by 4; the quotient will give the per centage very nearly. (Ure.) This rule may be employed for such sp. gr. as are not contained in the tables.

I. TABLE of the Per Centage of Pure Ammonia, in Water of Ammonia of the specific gravity 0·8750 to 0·9692. By Sir H. DAVY.

Sp. Gr.	Ammonia.	Water.
0·8750	32·50	67·50
0·8875	29·25	70·75
0·9000	26·00	74·00
0·9054	25·37	74·63

Sp. Gr.	Ammonia.	Water.
0·9166	22·07	77·93
0·9255	19·54	80·46
0·9326	17·52	82·48
0·9385	15·88	84·12
0·9435	14·53	85·47
0·9476	13·46	86·54
0·9513	12·40	87·60
0·9545	11·56	88·44
0·9573	10·82	89·18
0·9597	10·17	89·83
0·9619	9·60	90·40
0·9692	9·50	90·50

II. Table of the Per Centage of Pure Ammonia, and of Ammonia Water of 0·9000 in Water of Ammonia of the specific gravity 0·9000 to 0·9945. By Dr. Ure.

Water of 0·900.	Ammonia in 100.	Water in 100.	Sp. Gr. by experiment.
100	26·500	73·500	0·9000
95	25·175	74·825	0·9045
90	23·850	76·150	0·9090
85	22·525	77·475	0·9133
80	21·200	78·800	0·9177
75	19·875	80·125	0·9227
70	18·550	81·450	0·9275
65	17·225	82·775	0·9320
60	15·900	84·100	0·9363
55	14·575	85·425	0·9410
50	13·250	86·750	0·9455
45	11·925	88·075	0·9510
40	10·600	89·400	0·9564
35	9·275	90·725	0·9614
30	7·950	92·050	0·9662
25	6·625	93·375	0·9716
20	5·300	94·700	0·9768
15	3·975	96·025	0·9828
10	2·650	97·350	0·9887
5	1·325	98·675	0·9945

AMMONIACUM. A gum resin, the inspissated juice of the dorema ammoniacum. It is stimulant and expectorant, and is much used in catarrhs. *Dose.* 10 to 30 grs. in pills, or diffused through water.

AMMONIACUM, STRAINED. *Prep.* I. Boil the ammoniacum with water, until it forms an emulsion or milk, then strain it through canvass; boil the refuse a second time with more water; mix the liquors, and evaporate to a proper consistence.

II. Place the gum on a sieve or canvass strainer, and put it on the top of a copper pan, containing a little boiling water. The steam will soften the gum, which will then run through, leaving the impurities behind; evaporate as before.

Remarks. The first method is that usually adopted in trade; but the second preserves the odor of the gum much better. *Use.* To make the plaster of ammoniacum, and the plaster of ammoniacum and mercury.

AMNIOTIC ACID. Vauquelin and Buniva gave this name to allantoin, which, by some unaccountable mistake, they represent to have found in the liquor amnii of the cow, instead of the fluid of the allantois, as shown by Lassaigne.

AMULETS. Substances worn about the person to protect the wearer against some real or imaginary evil. Their protective power depends entirely on the imagination; they are therefore now wholly discarded, except by the most superstitious and ignorant. Camphor is frequently worn as a protective against fever.

AMYGDALINE. Discovered by Robiquet and Boutron Charlard. *Source.* The bitter almond and the laurocerasus.

Prep. Powder bitter almonds, from which the oil has been thoroughly expressed, and boil it repeatedly in alcohol of 93 or 94§; mix the several tinctures, and distil off the alcohol; mix the sirupy residuum with water, add a little yeast, and ferment; after the fermentation has ceased, evaporate in a water bath to the consistence of a sirup, and add alcohol of 94§; collect the precipitate, drain well, and purify by repeated re-solutions and crystallizations. *Prod.* 3 to 4§.

Prop., &c. *Form,* Silken crystalline scales; taste, sweet and nutty; scentless; soluble in water and *hot* alcohol. Its solution, mixed with milk of almonds, produces prussic acid and essential oil of almonds.

AMYGDALINIC ACID. A new acid discovered by Wohler and Liebig.

Prep. Dissolve amygdaline in baryta water, and boil the solution in a glass vessel as long as ammonia is evolved; then add dilute sulphuric acid until precipitation ceases; filter and evaporate the clear liquid in a water bath. *Prop., &c.* A colorless transparent acidulous mass; deliquescent in damp air, and soluble in water. With the bases it forms soluble salts but little known, called amygdalinates.

AMYLIC ACID. A new acid compound, first described by M. Tünnerman in Trommsdorff's 'Journal.' Its ultimate constituents are carbon 2·5, oxygen 3. It is but little known.

Prep. Three parts of muriatic acid are gradually added through a feeding tube, to one part each of starch, black oxide of manganese, and water, previously well mixed together and heated in a capacious tubulated retort, connected with a well-cooled receiver. The product is impure amylic acid, which should be saturated with carbonate of lime, and crystallized by gentle evaporation. This salt, decomposed by 73 per cent. of sulphuric acid, yields by distillation pure amylic acid.

Prop. It forms salts with the bases, which are mostly soluble and deliquescent, and possess the property of reducing the nitrate of silver and muriate of gold. It evaporates when gently heated, and gives out a sharp smell, resembling prussic acid.

ANACARDIUM INK. The cashew nut contains a fluid between the kernel and shell, which forms an excellent marking ink. On linen and cotton it turns gradually black, and is very durable. (Ure.)

ANALYSIS, (in Chemistry.) The resolution of any substance into its elements. It is divided into *qualitative* and *quantitative* analysis; and these again into *proximate* and *ultimate* analysis. The *first* consists in merely finding the components of a compound; the *second*, the components and the proportions of each of them; the *third*,

the proximate or compound constituents; and the *fourth*, the chemical elements of which it is composed. For success in chemical analysis a thorough acquaintance with the various properties of bodies is required, as well as an aptitude in applying this knowledge in discriminating them and separating them from each other. Judgment and expertness in manipulation are also essential. To enter fully into the subject of chemical analysis is not the object of the present work; nor would its size admit of such, even though every page of it were devoted to this subject. The reader will, however, find appended to each article of importance the most simple means of determining its *purity*, as well as detecting its presence in mixtures, and in some cases estimating its quantity.

ANATOMICAL PREPARATIONS, FLUID FOR. (*Objects of Natural History, &c.*) *Prep.* I. Saturate water with sulphurous acid, and add a little creosote.

II. Dissolve 4 parts of chloride of tin in 100 of water, to which 3 per cent. of muriatic acid has been added.

III. Dissolve 5 or 6 parts of corrosive sublimate in 100 of water, to which 2% of muriatic acid has been added.

IV. Mix together one part of ammonia water (strong) with 3 times its weight (each) of water and spirit of wine.

Remarks. These fluids are used by immersing the objects therein, in close vessels. The third formula is apt to render animal substances very hard.

ANCHOVIES, BRITISH. *Prep.* To a peck of sprats put two pounds of salt, three ounces of bay-salt, one pound of saltpetre, two ounces of prunella, and a few grains of cochineal; pound them all in a mortar, then put into a stone pan or anchovy barrel, first a layer of sprats, and then one of the compound, and so on alternately to the top. Press them down hard; cover them close for six months, and they will be fit for use, and will really produce a most excellent flavored sauce. *Remarks.* A large trade is done in this article, especially for making anchovy paste or sauce, when a little more coloring is added.

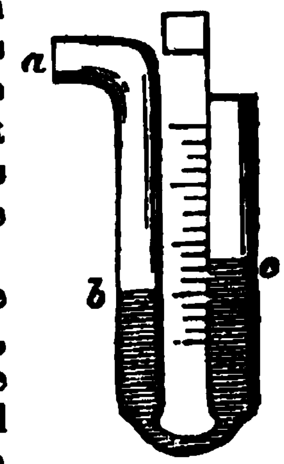
ANCHOVY POWDER. *Prep.* I. Pound anchovies to a paste, then rub them through a sieve, and add enough flour to make a dough, which must be rolled out into thin slices and dried for powdering.

II. Substitute British anchovies, and add coloring. *Use.* To make sauces.

ANCHUSIC ACID. This name has been given to the coloring principle of alkanet root, (the anchusa tinctoria,) but little is known respecting it. (See ALKANET ROOT.)

ANEMOMETER. An instrument for determining the force of the wind.

An excellent instrument of this sort which may be applied to determine the draught of a chimney as well, is the anemometer of Dr. Lind, the construction of which, by means of the annexed engraving, will be rendered familiar. *App.* The open end, *a*, is kept by means of a vane presented to the wind, which acting on the surface of the liquid (water) *b*, raises it in the arm *c*. The difference of the level of the fluid in the two arms of the instrument is the measure of the force of the wind. To estimate the draught of a flue or chimney, the arm *c* is placed in the chimney, and the orifice *a* in the apartment.



ANEMONINE. A substance noticed by Löwig and Fehling, extracted by hot alcohol from the anemone pulsatilla, nemorosa, and pratensis. By the action of baryta water on this substance, Löwig obtained a compound which has been called anemonic acid.

ANDERSON'S PILLS. *Prep.* Barbadoes aloes 2 oz.; jalap 1 oz., (both in powder;) oil of aniseed 2 drops; mix and beat them into a mass with sirup. *Dose.* 5 to 20 grains; purgative.

ANGELICA, CANDIED. *Prep.* Boil the fresh stalks in water, to remove their bitterness, then put them into a sirup boiled to a full candy height, and boiling hot; let them remain until nearly cold, when they may be taken out and dried. *Prop.* Cordial and stomachic.

ANGELICA, EXTRACT OF. I. (Dr. MOHR.) Macerate 2 lbs. of the bruised root in 1 gallon of rectified spirit of wine, for 7 days; strain and press; then macerate again in 1 gallon of proof spirit; filter each separately; mix and distil off the spirit; lastly, evaporate the remainder in a water bath to the consistence of an extract. *Remarks.* Quality very fine; odor and taste strongly balsamic.

II. Macerate 2 lbs. of bruised angelica root in 1 gallon of a mixture of equal parts of rectified spirit and water for 10 days, frequently shaking; then proceed as before. *Remarks.* Not so balsamic as the former.

ANGELICA, INFUSION OF. Dr. Mohr directs the use of hot water, or preferably wine. *Remarks.* An oil and water is also obtained from angelica, by distillation; a tincture is prepared, (with rectified spirit,) and pills are made of the extract.

ANGELIC ACID. During a recent analysis of angelica root, by L. A. Buchner, jun., he discovered a peculiar volatile acid, of a pungent sour smell, and biting acid taste; sometimes fluid and oleaginous, and sometimes crystallized in striated prisms. (Schmidt's Jahrb., Aug. 1842.)

ANGELICINE. A substance obtained from the root of angelica. The process is troublesome, and the product small.

ANGEL WATER. *Syn.* PORTUGAL WATER. *Prep.* Mix together 1 pint each of orange-flower and rose-water, ½ pint of myrtle water, ¼ oz. of essence of musk, and 1 oz. of essence of ambergris; shake them well up, and filter through white blotting-paper.

ANGOSTURA BARK. The true medicinal angostura or cusparia bark is brought from the West Indies; but a spurious and poisonous species is imported from the East Indies, and is frequently sold for or mixed with the former. The following tabular view of the characteristics of each will afford a ready means of detecting this fraud.

Tabular View of the Characteristics of the True and False Angostura Barks; drawn up by Dr. Pereira, from his own researches, and those of Guibourt, Fee, and others.

		True Angostura Bark.	Nux Vomica, or False Angostura Bark.
Form		Quills or flat pieces, straight or slightly bent	Quills or flat pieces; short; often very much twisted, like dried horn; arched backwards
Odor		Disagreeable	None, or very slight.
Taste		Bitter, afterwards somewhat acrid; persistent	Intensely bitter; very persistent.
Hardness and density		Bark fragile when dry; easily cut; light; tissue not very dense	Broken, or cut with difficulty; heavy; tissue compact.
Fracture		Dull and blackish	Resinous.
Epidermoid crust		Whitish or yellowish; insipid; unchanged, or rendered slightly orange red by nitric acid	Variable; sometimes a spongy rust-colored layer at other times whitish, prominent spots, more or less scattered or approximated. Nitric acid makes it intensely dark green or blackish.
Inner surface		Separable into laminæ; deepened by nitric acid	Not separable into laminæ; rendered blood red by nitric acid.
Infusion of the bark in 24 parts of water, with	Tinct. Litmus	Blue color destroyed	Slightly reddened.
	Sesquichloride of Iron	Flocculent dark grayish-brown precipitate	Clear yellowish-green liquor.
	Prussiate of Potash	No change; hydrochloric acid caused a yellow precipitate	Slight turbidness, not increased by hydrochloric acid.
	Nitric Acid	A small quantity makes the liquor cloudy; a large quantity makes it a transparent deep red	A small quantity makes the liquor clear and paler; a large quantity transparent red.

ANGOSTURIN. *Syn.* Cusparin. Saladin. Bitter Extractive. *Prep.* Digest bruised angostura bark in alcohol until the latter will take up no more; then filter and submit it to spontaneous evaporation. *Prop.* Dissolves in alcohol, water, and alkaline lyes; neutral; tincture of galls precipitates it from its solutions.

ANHYDROUS. (In Chemistry.) Without water; a term frequently applied to gases, salts, alcohol, acids, and some other substances, to express their existence in the *dry* state. The gases may generally be rendered anhydrous, by passing them through a tube containing very dry powdered chloride of calcium, and some of them by passing through strong sulphuric acid. Salts may generally be dried by cautiously submitting them to the action of heat; and alcohol, and many other volatile fluids, by careful distillation from chloride of calcium.

ANIMAL SUBSTANCES USED AS FOOD, PRESERVATION OF. Animal substances are preserved in various ways, among which may be mentioned—

1. *Exposure to the sun*, or in a stove, to as high a heat as possible without scorching them.

2. *Exposure to the frost* until they become frozen, and then keeping them in this state. Meat, fish, poultry, &c. are generally preserved in this way in the colder parts of North America, in Russia, and in many other parts of the world. In Lower Canada, the meat killed early in the winter is frequently kept in a frozen state for summer use, to prevent the necessity of killing during the hotter portions of the year. It remains perfectly fresh, tender, and good flavored.

3. *Salting in brine.* This method is both easy and effectual. The best plan is to dissolve about 4 lbs. of good salt in 1 gallon of water, for brine, and to immerse the meat therein, at the same time adding a few handfuls of undissolved large grained rock salt, more than it will dissolve, for the purpose of keeping up its strength. Three to ten days, depending on the size, is sufficiently long to keep the meat in the brine; when it is taken out it should be hung up to dry, packed in barrels with coarse-grained salt, or smoked, whichever may be desired. When the brine has been used for some time, it should be boiled with some more salt and 2 or 3 eggs, then skimmed and strained. Saltpetre added to brine gives the meat a red color, and brown sugar improves the flavor.

4. *Dry salting.* In many parts, as in Hampshire, Yorkshire, &c., the process of dry salting is adopted, which consists of merely well rubbing the salt, mixed with a little saltpetre, into the meat, and afterwards sprinkling some over it, and placing it on a board or trough in such a manner that the brine may drain off. Sometimes fresh meat is packed at once in casks, with the best *coarse-grained salt.*

5. *Pickling.* This plan is to steep the substance in vinegar, or a mixture of vinegar and beer. Fish is often served in this way.

6. *Pyroligneous acid* brushed over animal substances will keep them for any length of time. This acid imparts a smoky flavor; but pure acetic acid may be used instead. Before use, the substance should be washed or soaked in water.

7. *Immersion in olive oil.* Salmon and other fish are often preserved in jars of salad oil, well corked up, and cemented over.

8. *Potting.* Small birds, fish, cooked meat, &c. are frequently pounded to a paste, with spices and butter, and pressed into pots until nearly full, when melted clarified butter is poured over to about ¼ or ⅛ of an inch in depth. This plan is called "*potting.*"

9. *Smoking.* This is done on the large scale by hanging the articles up in smoking rooms, into which smoke is brought from dry wood fires, kindled in the cellar, for the purpose of allowing it to cool and deposite its cruder part, before it arrives at the meat. This process requires from six days to as many weeks to perform it properly, and is best done in winter. In farm-houses, where dry wood is burnt, hams, &c. are often smoked by

hanging them up in some *cool* part of the kitchen chimney. When the meat is cut into slices, or scored deeply with a knife, to allow the smoke to penetrate it, it is called "*buccaning*." This is frequently performed by hunters in the remoter parts of Europe, by placing the slices on a grating of sticks, about 3 or 4 feet high, over a fire made with the branches of trees, and continuing the drying and smoking until the meat be sufficiently cured.

10. *Jerking*. In some hot countries the meat, cut in thin slices, is dried in the sun, beat into a paste in a mortar, and pressed into jars for use. Sometimes meal or flour is added. This plan is called "jerking," or "charqui."

11. *For sea-stores*, a new and simple plan has been lately adopted. *Proc.* Immerse the meat, cut into slices of from 4 to 8 ounces each, for five minutes in a vessel of boiling water, and dry them on network, at a regular temperature of from 120° to 125° Fahr. Next evaporate the soup formed by washing the meat, to the consistence of a thick varnish, adding a little spice to flavor it; into this fluid immerse the perfectly dry pieces of flesh, and again expose them to the proper drying temperature. Repeat the operation of dipping and drying a second and a third time. *Remarks.* For use, the meat must be cooked in the usual way for boiling, &c. In this manner, meat may be preserved without salt, for 15 to 20 months.

12. *Skins are preserved by tanning*, or exposure to the action of oak bark and other astringents, until they are converted into leather; or by *tawing* them, which is somewhat similar.

Other methods have also been occasionally adopted for objects of natural history and anatomical preparations; as dilute spirit or weak solution of corrosive sublimate, both of which, however, harden the texture of animal substances considerably. This may be prevented in the former by adding a little liquor of ammonia. (See PUTREFACTION.)

ANIMATION, SUSPENDED. *Syn.* ASPHYXIA. *Causes.* Various; hence it has been divided into four varieties, viz.:

1. *From suffocation produced by hanging and drowning.*

2. *From suffocation produced by the inhalation of irrespirable gases or vapors, as the fumes of charcoal, fixed air, &c.*

3. *From strokes of lightning or electricity.*

4. *From extreme cold.* (Dr. Mason Good.)

No general rules can be given exactly suitable to each case; but the reader is referred to DROWNING. Whenever it is possible to procure medical aid, it should be immediately sought, as the delay of a single minute may put the case beyond the reach of assistance. The following valuable remarks on asphyxia, from the pen of an eminent physician, may, however, be well introduced here:

The treatment of asphyxia involves an attention both to the functions of respiration and to that of the true spinal marrow. The object, doubtless, is to effect a restoration of the respiratory and circulatory functions, the former of which has been arrested by the external conditions of the patient; the latter, by the contact of morbidly carbonized blood with the capillary vessels of the lungs. The first thing to be attempted is the restoration of warmth by active friction with warm hands, &c.; the second, the imitation of artificial respiration, by any means at hand, of which none is better, usually, than the action of alternate pressure and its relaxation, applied to the thorax and abdomen, so as to induce expiration first, and inspiration immediately by the play of the elasticity of the ribs. The third effort is made by suddenly dashing cold water on the face and general surface, previously warmed by the frictions, in the hope of inducing a more decided inspiration. Artificial respiration must be attended to, if these measures, very promptly enforced, fail; and unless the proper apparatus be present, the mouth of another person, of robust make, is to be applied to that of the asphyxiated person, covered with a handkerchief, the nostrils being closed. (Dr. Marshall Hall.)

ANISEED, COMPOUND SPIRIT OF. *Prep.* Aniseeds and angelica seeds, of each, 8 oz.; cassia bark and caraways, of each, ½ oz.; all bruised; proof spirit and water, of each, 1 gallon. *Proc.* Macerate for 3 or 4 days, then distil over 1 gallon.

II. Oil of aniseed 2 drachms; oil of angelica ½ drachm; oil of cassia 20 drops; oil of caraway 15 drops; proof spirit 1 gallon. Mix well.

Use. A pleasant cordial in flatulence, low spirits, &c. *Dose.* ½ oz. in water. Much used by some old ladies. *Remarks.* Should it be milky, shake it up with a tablespoonful of magnesia, and filter through blotting-paper.

ANISETTE DE BOURDEAUX. *Ing.* Aniseed 4 oz.; coriander and sweet fennel seeds, of each, 1 oz.; rectified spirit ½ gallon; water 3 quarts. *Proc.* Bruise the seeds, and macerate them for 2 days in the spirit and water; then draw over 7 pints, and add lump sugar 2 lbs.

II. Lump sugar 1½ lb.; oil of aniseed 12 drops; oil of cassia and caraway, of each, 5 drops; spirit, 60 u. p., 3 quarts. *Proc.* Rub a little of the sugar with the oils, then dissolve it in the spirit; add the water and filter through magnesia; lastly, dissolve the remaining portion of the sugar in the filtered liquor.

III. Good brandy 3 quarts; sugar 1¼ lb.; aniseed water 1 pint. As above. *Remarks.* An agreeable cordial.

ANNEALING. The process by which glass is rendered less frangible, and metals which have become brittle again rendered tough and malleable. *Glass* vessels, and other articles of glass, are annealed by being placed in an oven or apartment near the furnaces at which they are formed, called the "*leer*," where they are allowed to cool slowly, the process being prolonged according to their bulk. *Steel, iron, and other metals* are annealed by heating them and allowing them to cool slowly on the hearth of the furnace, or any other suitable place, unexposed to the cold. As a specimen of *unannealed glass*, the *Prince Rupert's drop* may be mentioned, and of unannealed *metals, common cast iron;* to each of which the reader is referred, in their alphabetical places.

ANNOTTO. A valuable coloring matter, imported into Europe in cakes, and usually made up in England into rolls, before sale. *Source.* The pellicles of the seeds of the bixa orellana. *Sol.* Alcohol, ether, volatile, and fixed oils, to each of which it imparts a beautiful orange color; very soluble in alkaline lyes, which darken it, and in

strong sulphuric acid, which turns it blue. *Remarks.* The best annotto is known as roll annotto; flag and egg annotto are not so much esteemed. *Use.* For dyeing, painting, coloring, varnishing, cheese-making, &c.

ANNOTTO, PURIFIED. *Syn.* ORELLINE. CONCENTRATED ANNOTTO. *Prep.* Boil annotto in a solution of pearlash, until it will dissolve no more; then add oil of vitriol, previously diluted with 20 times its weight of water, until no more coloring matter is thrown down, but not enough to make the liquor taste sour; wash the precipitate with a little cold water; then drain and dry it.

Remarks. This is the pure coloring matter of annotto, and possesses all the properties of the best annotto in a concentrated form.

ANNOTTO, COMMON. *Syn.* REDUCED ANNOTTO. ENGLISH ANNOTTO. *Ing.* Egg or flag annotto 24 lbs.; gum tragacanth, 10 lbs.; starch 6 lbs.; soap 1½ lb.; red bole, or Venetian red, 1 lb.; water q. s. *Proc.* Mix by heat in a copper pan, and form into rolls.

Remarks. Used for common purposes. Should it be attempted to pass this off for genuine annotto, the fraud may be detected by its partial solubility in alcohol.

ANNOTTO, CHOICE OF. Annotto should be chosen of a good flame color; brighter in the middle than on the outside. It should feel soft and smooth, and have a good consistence. It should possess a strong smell.

ANNOTTO DYE. *Prep.* Cut the annotto into small pieces, and boil it in a copper, with an equal weight of good pearlashes, then dilute with water to a proper color. *Process of dyeing.* Immerse the articles, previously rinsed in clean water, in the dye, and give them a good boil; then drain them out and rinse them well in clean water.

Remarks. Annotto is chiefly used for silks, to which it imparts a fine orange yellow color, the shade of which may be modified, by using different proportions of pearlash, and also by giving the stuff different mordants before putting it into the dye-bath.

ANODYNE. (From the Gr. ἀ, without, and ὀδύνη, pain.) A medicine which allays pain. Among the principal anodynes may be mentioned opium, morphia, camphor, and other medicines of the same kind. "The constant use of anodynes begets their necessity." (W. Cooley.)

ANODYNE NECKLACES, are formed of the roots of hyoscyamus, Job's tears, allspice steeped in brandy, jumble beads, or elk's hoof, to suit the fancies of the prescribers. *Use.* To procure easy dentition in children, and sleep in fevers. (Bah!)

ANODYNE, INFANTILE. *Prep.* Sirup of red poppies 1 oz., aniseed water 3 oz., brandy or spirit of wine ½ oz.; mix. *Use.* An excellent anodyne for infants. *Dose.* A small teaspoonful as required.

ANODYNE, MARTIAL. *Prep.* Dissolve ammoniated iron in water, and precipitate with liquor of potassa; wash and dry. *Remarks.* An obsolete preparation. It is sesqui-oxide of iron.

ANODYNE, MINERAL. An old preparation formed by dissolving diaphoretic antimony in water, and evaporating to dryness.

ANO ZABAGLIONE. *Prep.* Put 2 eggs, 3 teaspoonfuls of sugar, and 2 small glasses of marsala, into a chocolate cup, over the fire, and keep it rapidly stirred, until it begins to rise and hardens, then serve it up in glasses. *Remarks.* A pleasant Italian receipt for a cold: very nutritious.

ANTACIDS. Medicines that neutralize the acid of the stomach, and thus tend to remove heartburn, dyspepsia, and diarrhœa. The principal antacids are the carbonates of potassa, soda, ammonia, lime, and magnesia. Ammonia is the most powerful, and when the acidity is conjoined with nausea and faintness, is the best; when great irritability of the coats of the stomach exist, *potash* is preferable; when accompanied with diarrhœa, *carbonate of lime*, (prepared chalk;) and when with *costiveness*, *magnesia*. (See ABSORBENTS.) The *dose* of the *carbonates* of *potassa* and *soda* in powder is *half a teaspoonful*, of *chalk*, *a teaspoonful*, of *magnesia*, *a dessert spoonful*, and of *carbonate of ammonia*, 10 *grs.*, or a teaspoonful of the solution. All these are taken in water.

ANTHELMINTICS. Medicines that destroy worms. *List.* Among the principal anthelmintics are, *calomel*, *tin powder*, *castor oil*, *oil of turpentine*, *cowhage*, and *gamboge*. *Remarks.* A good plan for removing worms from children, is to give 3 to 5 grs. of calomel in sugar, overnight, and a dose of castor oil the next morning. The motions should be observed, and if worms be found, the same treatment may be followed once a week, until they are wholly removed.

ANTHIARINE. *Syn.* ANTIARINE. The active principle of the antiaris toxicaria, or upas poison-tree of Java. It is extracted from the upas poison by alcohol, and is obtained under the form of small crystalline scales. It is a frightful poison, to which no antidote is known.

ANTHRAKOKALI. A remedy recommended by Dr. Polya in scrofula and chronic rheumatism. *Prep.* Mix in an iron basin over the fire, 160 parts of powdered coal with 192 parts of strong boiling solution of caustic potassa. Stir until converted into a homogeneous black powder. *Dose* 1 gramme with ·25 gramme of powdered liquorice, 3 or 4 times daily.

Remarks. What remedy next? *Answer.* (See FULIGOKALI.) This is as bad as curing hydrophobia with the top of the snuff of a mould candle, or consumption with naphtha.

ANTHRAKOKALI, POMMADE OF. *Prep.* Anthrakokali in fine powder 1 part, lard 30 parts; mix.

Remarks. "*Said*" to have been tried by Dr Gibert at the Hôpital St. Louis, on 24 cases of cutaneous disease, many of which were cured, and in all, the symptoms were ameliorated.—?

ANTHRANILIC ACID. An acid discovered by Fritzsche, and prepared from indigo.

Prep. Dissolve indigo in a hot solution of pure potassa, sp. gr. 1·35, and add powdered peroxide of manganese, until the liquid on dilution and exposure to the air ceases to form indigo blue. It now contains anthranilate of potassa and free alkali; neutralize the alkali with sulphuric acid, dissolve out the anthranilate with alcohol, and decompose it with acetic acid, when orange-colored crystals of impure anthranilic acid will be obtained. Purify by uniting it with lime, crystallizing the salt and decomposing it with acetic acid,

when large colorless tabular crystals will be deposited as the solution cools. This is the pure hydrated acid.

Remarks. This acid is fusible and volatile, yielding crystals resembling those of benzoic acid. It dissolves in water, alcohol, and ether, and forms salts with the bases, called anthranilates. By destructive distillation, it yields aniline.

ANTI-ATTRITION. *Prep.* Grind together blacklead with 4 times its weight of lard or tallow. *Use.* To lessen friction in machinery, and to prevent iron rusting. *Remark.* This was once a *patent* article. Camphor is sometimes added, (7 lbs. to the cwt.)

ANTIDOTES. Medicines used to prevent or remove the effects of any poison or disease. Attached to each of the principal poisonous preparations mentioned in this work, the reader will find a notice of the best antidotes and treatment of cases of poisoning therewith.

ANTIHECTIC POWDER, POTERIUS'. *Prep.* Melt equal parts of tin and metallic antimony, powder, mix with six parts of powdered nitre, and deflagrate in a red hot crucible; lastly, powder and wash well with water. *Uses.* Astringent and tonic; formerly used in consumption. *Dose.* 10 to 30 grs. It is a mere mixture of the oxides of antimony and tin.

ANTIHYSTERIC DRAUGHT. (Dr. Josat.) *Prep.* Cyanuret of potassium 0·05 grammes; distilled lettuce water 60 grammes; sirup of orange flowers 20 grammes; mix.

Admin. One or two teaspoonfuls every ten minutes when the fit is expected; during the fit it may be given in larger doses; which, however intense, will be stopped or greatly allayed. Such is the assurance of Dr. Josat, who declares its efficacy to have been indisputably proved, in upward of 55 cases.

ANTIFERMENT. A substance sold in the cider districts, for the purpose of arresting fermentation. *Prep.* I. It generally consists of sulphite of lime in powder, or a mixture of equal parts of the sulphite and powdered mustard.

II. Mix together 14 lbs. of mustard seed with 1 lb. of cloves, and bruise them well without drying.

Use. A portion of either of the above added to cider or perry, tends to allay the fermentation, when it has been renewed. The second may be used for wine and beer as well as cider. *Caution.* In the above the sulph*ite* must be employed, not the sulph*ate*, which is quite a different article. (See Fermentation.)

ANTIMONIC ACID. *Syn.* Peroxide of Antimony. An acid compound formed of antimony and oxygen. It is the metal in its highest state of oxidation.

Prep. I. Digest metallic antimony in strong nitric acid, or dissolve it in nitro-muriatic acid; then evaporate by heat until the excess of acid be expelled, and throw the solution into cold water. The precipitate is the hydrated acid; by exposure to a heat of about 500° or 600° Fahr., the water is driven off, and the anhydrous acid remains behind.

II. Mix powdered metallic antimony with six times its weight of nitre, ignite in a silver crucible, and when cold, wash out the excess of alkali with hot water; the remaining antimoniate of potash, decomposed by muriatic acid, yields an insoluble residue of antimonic acid.

Prop. The hydrated acid (freshly precipitated) reddens litmus, and is insoluble in water, unless soured with tartaric or muriatic acid. When heated nearly to redness, it gives out oxygen and becomes antimonious acid. The hydrated acid is a white powder; the anhydrous acid has a pale yellow color, and is insoluble in water even with the assistance of the acids. With the bases it forms salts called antimoniates. *Uses.* It has been used in medicine, but owing to the high state of oxidation of the metal, appears to be nearly inert. It is said to be diaphoretic in doses of 2 to 10 grs., but it has been given in ½ oz. doses, 2 or 3 times daily, with good effect? (Wilson.) It is now seldom used in medicine. *Tests.* (See Antimony and Antimonious Acid.)

ANTIMONIOUS ACID. *Syn.* Binoxide of Antimony. Deutoxide of Antimony. An acid of antimony, containing 1 eq. less of oxygen than the last, or 2 eq. of antimony, and 4 eq. of oxygen.

Prep. I. Expose the white hydrated antimonic acid to a red heat, when 1 eq. of oxygen will be driven off along with the water, and pure antimonious acid remain.

II. Either the oxide or sulphuret of antimony, exposed to a strong heat, long contained in open vessels, gradually absorbs oxygen, and passes into antimonious acid.

III. The hydrated acid may be prepared by adding an acid to the antimonite of an alkali.

Prop. White, very infusible; insoluble in water, likewise in acids after being heated to redness. It combines with the bases forming salts called antimonites. The hydrated acid reddens litmus and dissolves in the muriatic and tartaric acids. *Use.* It is employed in medicine, and forms the basis of the celebrated nostrum, James's powder, as well as the pulvis antimonialis of the L. Ph. It appears, however, to be very inactive and uncertain in its operation. Dr. Elliotson exhibited the pulvis antimonialis, which contains nearly 40 per cent. of this acid, in doses of upwards of 100 grs., without producing any visible effect. The high state of oxidation in which the antimony exists in this compound, as mentioned in the last article, may account for its inactivity.

Remarks. Neither the salts of this nor the last acid have been applied to any useful purpose. *Tests.* (See Antimony.)

ANTIMONY. *Syn.* Metallic Antimony. Regulus of Antimony. *Hist., &c.* This word is generally applied to a gray metallic ore, which is a *sulphuret* of antimony. The pure metal, formerly called regulus of antimony, is of a whitish color, and semi-crystalline appearance. The derivation of the name is singular: Basil Valentine, a monk who flourished in the 15th century, believing that it fattened pigs, administered some to his brethren, with the charitable intention of giving them a plump appearance, but the experiment was attended with fatal results. Hence it was called "*anti-moine*," "*antimonk*," and gradually, antimony. The sulphuret is even now often given by farriers to horses, to render their coats sleek.

Prep. I. Heat the protoxide of antimony to redness in a crucible, having previously mixed it with an equal weight of cream of tartar; pour the melted metal into conical moulds.

II. Mix the powdered sulphuret of antimony of commerce with ½ its weight of iron filings, and submit it to a strong red heat in a covered crucible.

III. Common sulphuret of antimony 16 oz., cream of tartar 12 oz., nitre 6 oz.; mix, and proceed as above. When cold, separate the scoria. *Remarks.* The first form gives a chemically pure metal. On the large scale, the ore of antimony is reduced in a peculiarly shaped flame furnace, and afterwards melted under coal dust, in crucibles holding 20 to 30 lbs., placed upon a reverberatory hearth. The following formula has been recommended on the large scale.

IV. 100 parts of sulphuret ore, 60 parts of hammerschlag, (oxide of iron from the rolling mills,) 50 parts of common soda, or glauber salts, and 10 parts of charcoal. (Berthier.) *Prod.* From 65 to 70 parts of good metal.

Prop. Antimony is a whitish, brittle, volatile, and inflammable metal, and imparts its brittleness to its alloys.

Uses. It is used in medicine; combined with lead, it forms type metals, and with lead and tin, music plate metal, pewter, &c.

Tests. Sulphureted hydrogen throws down an orange-colored precipitate, soluble in pure potassa, and also in hot muriatic acid; from the latter solution, water throws down a whitish powder. If the sample be in the solid state, powder, boil in muriatic acid, and test as above.

Estim. Strongly acidulate the solution with tartaric acid, then throw down the antimony as a sulphuret by passing sulphureted hydrogen gas through it. After warming the solution and allowing it to cool again, the precipitate may be collected on a filter, dried, and weighed. A small portion must now be digested in strong muriatic acid, which will completely dissolve it if it be the simple sulphuret; in which case the quantity of antimony will be obtained by multiplying the weight of the sulphuret by 5, and dividing the product by 7. Should, however, only part of the precipitate be soluble in strong muriatic acid, a known weight of it must be introduced into a flask, and fuming nitric acid added, drop by drop, with great care, until a considerable quantity has been thus added; hydrochloric acid should now be added, and the mixture digested at a gentle heat, until the whole of the sulphur be dissolved. The solution must next be diluted with water, strongly acidulated with tartaric acid, and chloride of barium added as long as it produces a precipitate. This collected, dried, and weighed, and the weight divided by 3, will give the quantity of sulphur in the sample last operated on, which, by proper allowance and deduction from the weight of the sulphuret first found, will give the quantity of metal as before.

ANTIMONY ASH. *Prep.* Roast the common sulphuret of antimony in an earthen crucible for an hour. *Remarks.* Emetic in small doses, used to make metallic antimony.

ANTIMONY, DIAPHORETIC. *Syn.* Calx of Antimony. Peroxide of Antimony. *Prep.* Mix 1 lb. of powdered sulphuret of antimony with 3 lbs. of powdered nitre, and deflagrate by spoonfuls at a time, in a red hot crucible; collect the calx and powder it.

Remarks. The flowers that collect on the sides of the crucible must be carefully rejected, as they are violently emetic. *Use.* Once much employed in medicine as a gentle diaphoretic and laxative When this article has been well washed in water, it is called washed diaphoretic antimony, washed calx of ditto, &c. The process deprives it of some of its alkali.

ANTIMONY, FLOWERS OF. *Prep.* Throw powdered sulphuret of antimony, by spoonfuls, into an ignited tubulated retort, that has a short and very wide neck, until as many flowers collect in the receiver as are required. *Remarks* An impure oxysulphuret of antimony. Emetic in doses of 1 to 3 grs.

ANTIMONY, FLOWERS OF, (ARGENTINE.) *Syn.* Sesquioxide of Antimony. *Prep.* Keep metallic antimony melted in a vessel, freely exposed to the air, and furnished with a cool place for the flowers to rest upon; collect the flowers as deposited. *Remarks.* These flowers were formerly thought to be the binoxide, but Berzelius has clearly shown them to be the sesquioxide.

ANTIMONY, FULMINATING. *Syn* Fulminating Antimonial Powder. *Prep.* I. Grind well together 100 parts of dried tartar emetic, and 3 parts of lamp-black, or charcoal powder, then take a crucible, capable of holding 3 oz. of water, and having ground its edge smooth, and rubbed the inside with powdered charcoal, ¾ fill it with the above mixture, cover it with a layer of charcoal powder, and lute on the cover. Expose it for 3 hours to strong heat in a reverberatory furnace, and when taken out, let it stand to cool for 6 or 7 hours, before removing its contents, to prevent an explosion. The crucible being now opened, the contents must be hastily transferred without breaking to a wide-mouthed stoppered vial, when, after some time, it will crumble down into a powder of itself. (M. Serullas.)

II. Triturate together, very carefully, 100 parts of antimony, 75 parts of carbureted (roasted to blackness) cream of tartar, and 12 parts of lampblack: preserve it in vials. (Ann. de Chim., Oct. 1822.)

Remarks. When the above processes are properly conducted, the resulting powders fulminate violently on contact with water. It is to the presence of the very inflammable metal potassium that they owe this property. Another compound, made with 60 parts of carbureted cream of tartar, 120 bismuth, and 1 of nitre, treated as above, contains an alloy very rich in potassium. A piece the size of a pea introduced into a mass of gunpowder explodes it on being thrown into water. *Use.* For making some kind of fireworks. It is very probable that this is the preparation used by Capt. Warner.

ANTIMONY, MAGISTERY OF DIAPHORETIC. *Syn.* Materia Perlata. *Prep.* Add oil of vitriol to the water used in washing diaphoretic antimony, until it ceases to produce a precipitate. Wash this well with water.

ANTIMONY, MARTIAL DIAPHORETIC. *Syn.* Anticachecticum Ludovici. *Prep.* Fuse

equal weights of iron filings and sulphuret of antimony in a crucible, cool, powder, and mix with 3 times their weight of nitre, and deflagrate them by spoonfuls in a red hot crucible. Wash the product in water, and collect the brown precipitate. *Use.* Formerly given as a tonic, in doses of 10 to 20 grs.

ANTIMONY, MEDICINAL. *Syn.* MEDICINAL REGULUS OF ANTIMONY. *Prep.* Crude antimony in powder, melted with nearly its own weight of salt, and about ¼ of its weight of potash, or ½ its weight of a mixture of nitre and argol. When cold, separate the ashes from the mass, wash and powder. *Use.* Said to be stronger than crude antimony. Used in some quack medicines.

ANTIMONY, MURIATE OF. *Syn.* BUTTER OF ANTIMONY. CHLORIDE OF DITTO. SESQUICHLORIDE OF DITTO. OIL OF CAUSTIC ANTIMONY. *Prep.* Mix 2 parts of metallic antimony with 5 parts of corrosive sublimate, and distil from a wide-necked retort.

II. Grind together equal parts of common antimony and corrosive sublimate, and proceed as before.

III. Common antimony roasted until gray, or glass of antimony, 9 oz.; powder and mix with common salt 2 lbs.; oil of vitriol 1½ lb.; water 1 lb.; distil. *Prod.* 2½ lbs. of butter of antimony.

IV. Common sulphuret or glass of antimony, as last, 7 lbs.; common salt, 28 lbs.; oil vitriol, 21 lbs.; water, 14 lbs.; distil.

V. Boil 20 parts of powdered common sulphuret of antimony, in 100 parts of muriatic acid to which 1 part of nitric acid has been added. A little pernitrate of iron is used to color it, and it is made up to the sp. gr. of about 1·4. This article is improved if the crude antimony be roasted before dissolving it in the acid.

Prop. When pure, it somewhat resembles butter, melts with a gentle heat, and crystallizes on cooling; it deliquesces into an oily liquid when exposed in a damp place, and this was once the common method of obtaining a cheaper article for sale. It is decomposed by water. *Use.* It is a common caustic with farriers.

Remarks. The first of these processes produces the pure sesquichloride of antimony, the second an article less pure, and the last one the liquid sold as butter of antimony in the shops. The solution of the antimony in the acid is attended with the evolution of a large quantity of sulphureted hydrogen; it should therefore be done under a chimney.

ANTIMONY, SOLUTION OF MURIATE OF. *Syn.* LIQUOR STIBII MURIATICI. (Pharm. Borruss.) *Prep.* Dissolve pure oxide of antimony in pure muriatic acid.

ANTIMONY, OXIDE OF. *Syn.* SESQUIOXIDE OF ANTIMONY. *Prep.* I. (P. E.) Dissolve ℥iv of sulphuret of antimony in fine powder, in 1 pint of muriatic acid by heat, filter and pour the solution into 5 pints of water, collect the precipitate on a calico filter, and wash it well, *first* with cold water, and then with a weak solution of carbonate of soda; and lastly, a second time with cold water, until the latter ceases to affect turmeric paper. Dry with a gentle heat.

II. To the solution of the sulphuret of antimony as prepared above, enough water is added at 167° Fahr. to produce slight turbidness; it is then left to itself until all the sulphureted hydrogen has escaped, when it is again filtered and mixed with 6 times its weight of water. *Prod.* From 4 oz. of the sulphuret,—1¾ oz. pure white oxide of antimony soluble without residue in tartaric acid. (Giesler.)

III. Digest the precipitate obtained by mixing chloride of antimony with cold water, in a weak solution of carbonate of potassa, having first well washed it with cold water; agitate occasionally for some hours, then collect the powder, wash it well and dry it.

IV. Add a solution of carbonate of soda to another of tartar emetic; wash the precipitate well, and dry it.

Remarks. This is a dirty white powder; fusible and volatile; changing into antimonious acid when strongly heated in open vessels. It is a feeble base. *Uses.* To make tartar emetic, and in medicine, as a diaphoretic, in doses of 2 to 10 grs., and an emetic and purgative in larger doses. It has been proposed as a substitute for James's Powder. *Pur. and Tests.* It is completely soluble in hydrochloric acid, and again thrown down as a white powder by cold water; perfectly soluble in a solution of tartaric acid; it is thrown down from its solutions as an orange-red powder by sulphureted hydrogen; it volatilizes by heat.

ANTIMONY, OXYCHLORIDE OF. *Syn.* MERCURIUS VITÆ. POWDER OF ALGAROTH. OXYDUM ANTIMONII NITRO-MURIATICUM, (D. P.) *Prep.* Mix the liquid chloride of antimony with cold water; wash and dry the precipitate. *Prop.* Similar to the oxide. Used to make tartar emetic.

ANTIMONY, PURGING. *Syn.* CATHARTIC ANTIMONY. *Prep.* Digest ½ lb. of glass of antimony in 1½ lb. of oil of vitriol for two days, evaporate to dryness, powder and wash the residuum; dry and melt with 4 oz. of Glauber salts, and 8 oz. of sal enixum; again powder, wash, and dry. *Remarks.* This has been said to be the most certain of all the antimonial purges. *Dose.* 2 to 10 grs Seldom used.

ANTIMONY, SMELTED. *Prep.* Melt crude antimony, and pour it into conical moulds. *Uses, &c.* Diaphoretic and alterative. *Dose.* 10 to 60 grs. Used in rheumatism, scrofula, and skin diseases the refining of gold, &c.; and when reduced to powder. by ladies, to paint their eyelashes black.

ANTISEPTICS Substances that prevent putrefaction. The principal antiseptics are *common salt, saltpetre, spices, sugar, vinegar*, and *creosote*. For antiseptic process, see ANIMAL SUBSTANCES, PUTREFACTION, PROVISIONS, &c.

ANTISEPTIC MEDICINES. Of these the principal ones are *bark, acids, wine, spirits*, and *camphor*.

ANTISPASMODICS. Medicines that allay spasms and other pains. *Bark, opium, camphor, ether, musk, castor, assafœtida, valerian*, and *chalybeates*, are antispasmodics.

ANTISPASMODIC MIXTURE. (DR. COLLIER.) *Prep.* Mixtures of assafœtida and camphor of each ℥iss, tincture of valerian ℥j. Mix. *Dose.* One tablespoonful three or four times daily.

ANXIETY, NERVOUS. This unpleasant state may be removed by keeping the bowels reg-

ular with mild purgatives, taking plenty of exercise in the open air, adopting a light nutritious diet, and seeking pleasant society. A teaspoonful of carbonate of soda or magnesia, or a few drops of laudanum, taken the last thing at night, will generally have the effect of *preventing watchfulness.*

APERIENT. A medicine that gently opens the bowels. Among the best mild aperients may be mentioned small doses of *castor oil, Epsom salts, phosphate of soda,* (*tasteless salt,*) or *seidlitz powder; compound rhubarb pills, compound aloetic pills,* and *pil. rufi.*

APERIENT, DR. COLLIER'S SALINE, (ANTIMONIAL.) *Ing.* Double tartrate of potassa and soda ℥ij, carbonate of soda ʒij, outer yellow peel of the orange (fresh) ʒij, tartar emetic 1 gr., boiling water 1½ pint. *Pro.* Pour the water on the other ingredients, and macerate until cold in a covered vessel. *Dose.* A small tumbler or teacupful, mixed with a tablespoonful of lemon juice, or about a dozen grains of tartaric or citric acid, and drunk while effervescing, forms an agreeable mild aperient.

APIARY. (From *apis,* a bee.) A place where bees are kept.

Establishment of an Apiary. The proper time for this purpose is about February, or the beginning of March, as the stocks have then passed through the winter in safety; the combs are then empty of broods, and light of honey, and may be removed with safety and ease. *Stocks* should be selected by a competent judge, as the weight alone cannot always be relied on; such as weigh 12 lbs. and upwards, the number of bees being also observed, and that they are well combed to near the bottom, may be safely chosen.

As soon as they are brought home they should be set in the *bee-house,* care being taken to keep them dry and from the attacks of vermin. The next day plaster the hive to the bee-board, leaving an entrance the size of the little finger.

If the season has passed, the first and early swarm should be selected, as late ones or casts are not worth keeping, unless two or three of them have been united.

The time for removing stocks is in the evening; the hives should be raised by wedges some hours previous, unless the floor be moveable with the hive, otherwise many bees will remain on the floor at the time of removal, and prove very troublesome. When the floor is moveable, plaster the hive with mortar to the board, and pin a card pierced with holes before the entrance; in this way it will travel any distance in safety.

Swarms should be brought home the same evening that they are purchased; if delayed a day or two, combs will be worked, and subject to be broken in removing.

Management of Bees. The best situation for bees is to the north, with a range of hills wooded on the summit, and toward the base enriched with heather; and southward, gardens where hardy winter-greens have been allowed to flower, as early food for the bees. White mustard should also be sown very early, in patches near the hives; but not nearer than one yard. A few dwarf flowers may come within two feet, but tall ones would assist insects to get up. To the west it would be desirable to have a shrubbery, a wood, a broomy common, or heather moor.

The stations for the hives must be six yards asunder, and never nearer than three yards. The board on which they are placed ought to be of one piece; or if joined, the under side of the joining should be lined with a thinner board, fixed closely with wooden pins. The edges of this rounded standard should project four inches all round from the hive. Place it on three wooden pillars sixteen inches long, ten inches above the ground, but six inches of its length should be firmly thrust into the earth; in all, its length should be sixteen inches. The pillar in front should be an inch shorter than the other two, and the three pillars should be within twelve or fourteen inches of the outer edge of the board, to exclude rats and mice. For the same reason no tall-growing plant, no wall, nor any means for ascent should be within three or four feet of the hive. In fine weather the entrance to the hive must be four inches long, and an inch and a half in depth.

In the beginning of the fine season, when the bees can get food, or have stores remaining, the bee-master has nothing to do but to keep the ground about the hives clear from weeds, and from whatever might enable vermin to climb there. Yet as a thriving stock inclines very soon to swarm, the hives must be frequently looked after from eight in the morning till five in the afternoon. The symptoms are generally thus:—The little city seems crowded with inhabitants. They are continually in motion during the day; and after working-time they make loud noises. The drones may be seen flying about in the heat of the day, and the working bees go with a reeling motion and busy hum. When the bees come regularly out of the hive, let no noise, no interruption incommode them; but if they fly long, as if they were unsettled, some tinkling noise, or the loud report of a gun, will make the fugitives repair to the nearest lodgings. If there is an empty hive, with combs and some honey in it, they will readily go there. If a new hive is used, remember to smooth it well within, and singe off loose straws. Perpendicular sticks should never be employed. Four cross sticks at equal distances will support the combs. Old hives do very well for late swarms, that are not to be preserved through the winter; but box-hives are best for them, as the bees work fastest there. They are not, however, fit for being kept through the cold seasons.

It is to be observed, that great haste in forcing a swarm into the hive may disperse them. Give them time to settle undisturbed, though keep a steady eye on their motions; but whenever they gather into a cluster, lose no time in placing the hive over them. If the swarm rest on any thing that can be brought to the ground, spread a clean linen cloth; lay two sticks on it, two feet asunder; lay the body on which the swarm have fixed, gently on the sticks, covering it with the hive by a motion the least perceptible, and taking care that the edges of the hive rest upon the sticks. Cover hive and all with a cloth, for the sun might allure the bees to rise again. When they have gone into the hive, cover it with its own board, and carry it cautiously to its station. Bees are

apt to leave their hive even after they begin to work, so they must be watched till evening, and throughout the ensuing day. Whenever they are sure to remain, fix the hive to its board with a little lime round the edges; and crown it with green sods, to keep out too great heat or rain.

If a hive divides into two swarms, it is a sign that each swarm has a queen. Put each into old hives or boxes, but they must be kept separate. If a cluster of bees about the size of a small plum are seen together, the queen will generally be found there. Separate them, and with a drinking glass turned down, you may seize the queen. Put her, and a score or two of her subjects, into a box full of holes, large enough to admit air, and yet not to allow the bees to escape. Feed her with honey-combs, and keep her in reserve in case of the death of a queen in one of the hives. When a hive ceases to work, it is a sure sign the queen is no more. Then the bee-master may wait an hour and not see a loaded bee enter the habitation. But if the spare queen be taken late in the evening, (wet her wings to prevent her escape,) and introduced to the desponding society, they will receive her gladly, and begin to work.

If a hive fight among themselves, be assured there are two queens; and they will destroy each other, if one is not taken away.

When bees are to swarm a second or more times they do not come out in clusters; but they make a sound called *bellings*, which may be heard; ceasing for a little, and renewed again and again. If there are different tones, it is certain there are several young queens in the hive. It is only by putting the ear close to it that the sound can be heard distinctly.

To take the honey without destroying the bees. In the dusk of the evening, when the bees are quietly lodged, approach the hive, and turn it gently over. Having steadily placed it in a small pit, previously dug to receive it, with its bottom upwards, cover it with a clean new hive, which has been properly prepared, with a few sticks across the inside of it, and rubbed with aromatic herbs. Having carefully adjusted the mouth of each hive to the other, so that no aperture remains between them, take a small stick, and beat gently round the sides of the lower hive for about ten minutes or a quarter of an hour, in which time the bees will leave their cells in the lower hive, ascend, and adhere to the upper one. Then gently lift the new hive, with all its little tenants, and place it on the stand from which the other hive was taken. This should be done some time in the week preceding Midsummer-day, that the bees may have time, before the summer flowers have faded, to lay in a new stock of honey, which they will not fail to do, for their subsistence through winter.

The color of the honey shows whether it is fine or inferior. If it be wanted to press some in the comb, choose the fairest and those that have not been broken: wrap each comb in white paper, such as lines the blue cover of loaf sugar. Set it edgewise as it stood in the hive, and it may be preserved many months. The combs meant to be drained must be cut in slices. Lay them on a hair-search, supported by a rack over the jar, in which the honey is to remain; for the less it is stirred after draining, it keeps the better. Fill the jar to the brim, as a little scum must be taken off when it has settled. A bladder well washed in lukewarm water, ought to be laid over the double fold of white paper with which it is covered.

To keep hives for winter. They must not be more than three years old, and well stocked with bees. A hive for preserving should weigh from thirty to forty pounds. Place them in October where they are to remain. Stocks of less weight than 21 lbs. in September should never be kept. In most cases light stocks will require feeding, which may be done by inserting little troughs containing a mixture of equal parts of sugar and mild beer, into the hive in the evening, and removing them the next morning. (See also BEES.)

APOPLEXY. A sudden suspension or loss of the powers of sense and motion; the heart continuing to beat and the lungs to act, but generally with difficulty. During the fit the patient frequently lies in a state resembling sleep, or the stupor induced by drunkenness.

Treat. Medical aid should be *immediately* sought, as the delay of only a few minutes may render the skill of the most talented surgeon unavailing. Until the arrival of the latter, the patient should be kept easy and cool, with head and shoulders elevated, the neckcloth removed, and the clothes loosened, to avoid pressure on any portion of the body; the windows should be opened, and crowding round the patient especially avoided, a free exposure to fresh air being desirable. In this state of affairs the practitioner should be waited for. Where medical aid cannot be procured, (as in remote places, &c.,) rather copious bleeding from the arm should be resorted to; cold water should be poured upon the head, and the bowels opened by means of active purgatives: 10 grs. of calomel may be immediately given, and its action promoted by the use of saline purgatives and stimulating clysters. The legs may be placed in pretty warm water, and blisters applied between the shoulders. When these means prove successful, the remainder of the treatment may consist in the administration of mild purgatives and diaphoretics, avoiding stimulating food or drinks, and other exciting causes.

Prev. Apoplexy is frequently preceded by giddiness, pain, and swimming in the head, loss of memory, drowsiness, noises in the ears, specks floating before the eyes, nightmare, laborious respiration, &c. When any of these symptoms occur in a person of apoplectic habit, opening medicines and a light diet should be at once adopted, and wine, beer, and spirits avoided; and if the symptoms increase or continue, bleeding may be had recourse to. If the admonitions of nature were attended to, many cases of apoplexy might be prevented.

Remarks. Short, robust, and plethoric persons, having short, thick necks, are the most liable to apoplexy; in them the fit generally comes on without warning. Persons once attacked with this malady are regarded as especially liable to the same again.

APPENSA. I. Root of vervain hung round the neck by a yard of white satin riband for scrofula; but the usual medicines must be exhibited during the same period.

II. A root of the peony suspended to the neck

in epilepsy; its use to be accompanied with that of the most active cathartics.

III. Magnes arsenicalis, or camphor, hung to the neck so as to reach the pit of the stomach, to guard against contagion.

Remarks. All these probably act by keeping up the courage and spirits of the wearer.

APPETITE. An instinctive desire to perform certain natural functions. In its commoner sense, it is confined to a desire for food.

Remarks. The sensations of hunger and thirst are seated in the stomach, and are necessary to the body in a state of health. They are, however, frequently disordered and altered in various ways, in consequence of diseased action of the stomach and nervous system, or from vicious habits. A healthy appetite for food is usually a most certain indication that nature requires a supply; yet when irregular, it should never be indulged in beyond a moderate extent. In the gratification of the appetite, certain regulations should be observed, and a boundary put to mere animal gratification. By slowly eating and thoroughly masticating or chewing the food, the stomach becomes gradually distended, and the individual feels himself satisfied only after he has received a due proportion thereof, sufficient for the nourishment of his body; but, on the contrary, if the food be swallowed too rapidly, and without proper mastication, it will press heavily and roughly against the sides of the stomach, and induce a sensation of fulness, before a sufficient quantity has been taken to meet the continual demands of life; the consequence will be, that hunger will soon return. Persons who labor or take much exercise have generally a better appetite than those who lead a sedentary occupation; this arises from the functions of the stomach and bowels being promoted through the action of the muscles of the abdomen increasing the healthy peristaltic action of those viscera. When an enormous appetite exists in persons leading a sedentary life, it may fairly be presumed that either the food passes off imperfectly digested, or that the coats of the stomach are in an unhealthy state. More food is required in winter than in summer, in consequence of a greater radiation of the heat of the body, and hence a greater desire for food is usually an accompaniment of that season. In persons who lead a more sedentary life in winter than in summer, the reverse is, however, frequently the case; the want of exercise producing a corresponding loss of appetite.

The various deviations from the healthy standard, or the natural desire for food, constitute *diseased appetite*, among which may be mentioned the following.

APPETITE, CANINE. *Syn.* VORACITY. INSATIABLE HUNGER. BULIMIA. This complaint is generally symptomatic of pregnancy, worms, and diseases of the stomach and other viscera, but sometimes exists as a separate disease. Many persons eat enormously from a mere vicious habit, which is certain to weaken the digestion, and thus induce an increasing desire for food.

Treat. When children display a voracious appetite, worms may be suspected, and vermifuges should be administered, which will generally remove it. In adults, the common cause is imperfect digestion, arising from stomach complaints or an excessive consumption of food, by which the system receives an insufficient quantity of nourishment, and the languor and gnawing pain of disease is mistaken for that of hunger. The best plan in this case is to regulate the diet, to keep the bowels moderately open with gentle laxatives, and to administer tonics, as bark and steel, or bitters, as orange peel and gentian. When *pregnancy* is the cause, a plentiful supply of nutritious food and good malt liquor may be adopted with advantage. When the practice wholly depends on vicious habits of indulgence, small doses of tartar-emetic or ipecacuanha, mixed with the food, will generally effect a cure.

APPETITE, DEPRAVED. *Syn.* PICA. A desire for unnatural food, as dirt, cinders, tallow, chalk, &c. *Treat.* The method detailed at the end of the last article may be followed in this. Emetics and purgatives, with rhubarb, bark, and steel, are the best remedies.

APPETITE, DEFICIENT. A bad appetite generally arises from a disordered stomach, and is best improved by exercise and the occasional use of saline purgatives. Chalybeates and bitters will also prove advantageous. A piece of rhubarb chewed an hour before dinner is employed by some persons to create an appetite; others suck 2 or 3 ginger lozenges, or take a small glass of bitters, for the same purpose. One or two 4-grain compound aloes pills of the London Pharmacopœia, taken in the middle of the morning, have been strongly recommended, under the name of dinner pills. (See also DYSPEPSIA.)

APPETITE, DRAUGHT TO PROMOTE THE. Compound tincture of gentian ½ oz.; sal volatile ½ a teaspoonful; cinnamon water 1 oz.; compound tincture of cardamoms 1 teaspoonful. Mix for a draught to be taken an hour before a meal.

APPETITE, MIXTURE TO RESTORE THE. *Prep.* Gentian root sliced ½ oz.; fresh orange and lemon peel, each 1 oz.; tincture of rhubarb 1 oz.; compound tincture of cardamoms ½ oz.; spirits of red lavender ½ oz.; boiling water 1 pint. *Proc.* Pour the water on the gentian and peels, and macerate for 2 hours; strain, and add the other ingredients; and if it be wanted very clear, it may be filtered through blotting paper; lastly, add 2 oz. of lump sugar. *Dose.* A small wine-glassful early in the morning or shortly before dinner.

APPLE. The apple is a wholesome and pleasant fruit when perfectly ripe, and may be eaten either raw, roasted, or boiled. The more aromatic and flavored varieties are well adapted for dessert fruit, and are especially useful to persons of a full or confined habit of body.

APPLE-FOOL. Put the peeled and cored fruit into a jar, with moist sugar to render it palatable, and a very little cider or perry; place the jar in a saucepan of water over the fire, and continue the heat until the apples become quite soft, then pulp them through a colander, and add a sufficient quantity of milk, a little cream, and sugar to complete the sweetening. Mix well.

APPLES A LA CREMONA. *Prep.* Cut the best cooking apples into small squares, until you have about 1½ lb., strew over them 1 lb. of

good moist sugar and several long strips of lemon-peel, then cover them up close in a bowl. Next day put the apples, &c., piece by piece, into a small stewpan, with 3 or 4 tablespoonfuls of cidor or perry, and simmer gently until they become clear; then take them out, and when cold build a wall round a small dish with the square pieces, place the strips of lemon-peel on the top, and pour the sirup into the middle.

APPLES, DRIED. *Syn.* BAKED APPLES. *Prep.* Place any quantity of apples in a cool oven, 6 or 7 times in succession, flattening them each time by gentle pressure, gradually applied, as soon as they are soft enough to bear it; then take them out, and as soon as cold put them on clean dishes or glass plates. The sour or tart variety of apples is the best for baking.

APPLES AND PEARS, PRESERVATION OF. One of the best ways to preserve valuable fruit of this description, is to wrap each in a piece of clean dry paper, and to fill small wide-mouthed jars or honey-pots therewith, and to pack them in the following manner, in a dry and very cold place, (as a cellar,) but where the frost cannot reach them. The pots, of the shape of fig. 1, are placed in rows one in the other, as in fig. 2, and the space (*a*) between the two pots filled up with plaster of Paris made into a paste with water; the joint is thus rendered air-tight, and the fruit will keep good for a long time. The mouth of the top jar should be covered with a slate.

1.

2.

Remarks. The fruit should not be *too ripe* for the purpose of being preserved; and the later sort is the best. The jars may be taken one at a time from the store-room, as wanted, and the fruit exposed for a week or ten days in a warm dry room before being eaten, which will much improve the flavor. Another plan, which is a modification of the above, is to place alternate layers of bran or clean dry sand and apples, either naked or wrapped in paper, in jars, until they are full, then to shake them well to settle the bran between the fruit, and to add more if required; they are the : packed away as before described.

II. *Fruit is kept in the large way for the London market* by placing in a cool situation, first a layer of straw or paper, then a layer of apples, next a layer of straw, and so on alternately, to the height of 20 to 25 inches, which cannot be well exceeded, as the weight of the superincumbent fruit would be apt to crush or injure the lower layers. This plan is frequently modified by placing alternate layers of fruit and paper in baskets or hampers, and covering them well over before placing them in the fruit-room. The baskets may then be piled one over the other without injury to the fruit.

Remarks. Apples or other fruit intended for preserving in the above way should never be laid in heaps or allowed to touch each other, as they thereby acquire a bad flavor. They should be gathered in dry weather and immediately carried to the fruit-room, when they should be laid, if not *singly*, at least thinly, on the floor or shelves, on paper, and packed away as soon as possible. The use of *brown paper* is inadmissible, as it conveys its peculiar flavor to the fruit. Thick *white brown* paper is the cheapest and the best.

III. (*American method.*) The apples or pears, after being peeled, are cut into eighths, the cores extracted, and then dried in the sun or in a kiln or oven until they are quite hard. *Remarks.* In this way fruit is kept in the United States for two or three years.

For use, wash the fruit in water, then pour boiling water on it; let it stand for a few minutes, and use it as fresh fruit. The water it has soaked in is an excellent substitute for fresh juice.

APPLE SUGAR. *Prep.* Express the juice, and add chalk until the whole of the acid is saturated; pour off the clear liquor; then clarify by boiling in a clean pan with some white of egg; skim off the dirt; and lastly evaporate by a gentle heat to a proper consistence. *Remarks.* 1 cwt. of apples yield about 84 lbs. of juice and 12 lbs. of crude sugar.

APRICOTS, DRIED. *Syn.* CANDIED APRICOTS. *Prep.* Thrust out the stones with a wooden skewer, then pare them and roll them in dry powdered lump sugar; afterwards put them into a cold sirup, made with 2 lbs. of lump sugar to ¾ of a pint of water, and heat them gradually *nearly* to the boiling point, turning them frequently. Then pour them into a deep dish, and next day scald them again, adding as much sugar as will dissolve; again let them rest until the next day, when they must be placed on a hair-sieve to drain and dry.

Remarks. The fruit should not be quite ripe. Sometimes the apricots are cut into halves or quarters before preserving, and at other times pickled with the skins on; in the latter case they are gathered sooner, and infused in cold water with some vine leaves; next taken out and gently immersed in fresh water until they turn yellow, and then rubbed with a flannel and some salt to remove the down; they are then again soaked in the pan with the vine leaves, until they turn greenish. The best are now selected, rubbed dry, the stones extracted, and boiled in sirup as above described.

AQUETTA. The poison prepared by the once notorious woman named Toffana Tophana, appears to have been alkarsine, or some preparation of the kadodule series, to which article the reader is referred. The emperor Charles VI. declared to his physician Garelli, that it was arsenic dissolved in aqua cymbelaria.

ARABESQUE. The ornamental designs of this kind, so much employed to beautify leather and fancy cloth binding, are produced by the pressure of hot plates or rollers, having the design sunk into them. (See BOOKBINDING.)

ARABINE. *Syn.* SOLUBLE GUM. *Prep.* Dissolve gum arabic in water; filter, and add alcohol to throw down the arabine; filter and dry the residuum by a gentle heat. *Prop.* Similar to pure gum arabic; over the finer sorts it possesses little or no advantage.

ARBUTUS SUGAR. *Prep.* From the fruit of the strawberry, in the same way as apple sugar. Strawberries are said to yield one-fifth of their weight of sugar, and the rape, or pressings, yield by fermentation and distillation a very pleasant spirit.

ARCANUM BECCHINUM. A solution of livers of sulphur and sugar in water. (Willis.)

ARCANUM CORALLINUM. Red oxide of mercury digested in potash water, and spirits burned on it. *Remarks.* Formerly used to excite salivation and as an escharotic.

ARCANUM DUPLICUM CATHOLICUM. An amulet composed of the roots of plantain and colchicum, recommended by Wedel against contagion. A relic of superstition.

ARCHIL. *Syn.* ORCHIL. TURNSOLE. LITMUS. CUDBEAR. PERSIO. A beautiful violet-red or blue color, prepared from several species of lichens, (the rocellus, parellus, &c.) In Great Britain it is principally prepared from the lecanora tartarea and parmelia omphilodes. Archil is met with in three states—a violet-red liquid paste—in blue lumps—and in powder.

Uses, &c. It is largely employed to dye blues, violets, &c., mixed with other colors, to which it imparts a beautiful bloom. It is generally used as a finishing bath, by passing the fabric, already dyed of the same color, through archil mixed with hot water. Its beauty, however, is deceptive, and soon decays. *Solvents.* Water, urine, ammoniacal and alkaline lyes, acidulated water. *Alkalis* turn it *blue, acids red;* hence its value as a test for these articles in chemistry. Spirit stained with archil is sometimes used to fill the tubes of thermometers, but the color soon fades. An aqueous infusion of archil stains marble of a beautiful violet color of considerable permanence. (Fay.) In the state of powder it is called cudbear, under which form, when used with skill, it possesses greater permanency, and dyes all shades, from pink and crimson to blue. The word archil, as commonly applied, means the liquid archil, or violet color, sold for staining wood, dyeing, &c. Lump archil, or dyer's archil, a similar colored substance, under the form of a paste or lumps. Turnsole or litmus is archil prepared of a bluish color, and made up into small lumps, and cudbear is archil in the state of powder, which has undergone some trifling preparation for the dyer. The names are, however, frequently used indiscriminately.

ARCHIL, TO DYE WITH. *Proc.* Diffuse the archil or cudbear in warm water, then raise it to nearly the boiling point, and pass the cloth, previously prepared by rinsing in cold water, through the dye until the proper shade is produced.

Remarks. This plan is principally employed to bloom or finish off goods dyed of a permanent color, as before alluded to. Pearlash, or milk of lime, added to the bath, deepens the shade; acids redden it. *A beautiful crimson red* is obtained, by first passing the stuff through a mordant of tin and tartar, and then through a bath of archil mixed with a little solution of tin. By proper management of this dye, lilachs, violets, mallows, rosemary flowers, soupes au vin, agates, and other shades may be produced, on silk or cloth, either alone, or in conjunction with other dyes to modify it. ½ lb. of archil or cudbear will dye 1 to 2 lbs. of cloth.

ARCHIL, FACTITIOUS. A factitious coloring matter, resembling archil, is prepared by fermenting together a mixture of rotten onions with an equal weight of pearlash, for a few days, and then adding ½ of the weight of the pearlash in sugar of lead. The particulars of the process essential to its success are, however, kept a secret.

ARCHIL, INFUSION OF. *Syn.* INFUSION OF LITMUS. *Prep.* Digest 1 oz. of powdered litmus in 1 pint of hot water, and filter. *Remarks.* It will not keep without the addition of spirit. Used for testing. (See the TINCTURE.)

ARCHIL, LIQUID. *Syn.* COMMON ARCHIL, (of the shops.) *Prep.* The archil lichen, well bruised between stones, is moistened with a crude ammoniacal liquor, or urine, mixed with a little quicklime; in a few days it acquires a purplish red color, and is then steeped in urine until all the color is extracted. *Use.* As a dye, especially for staining wood, and tinging silk stockings, &c.

Remarks. When the process is conducted with free access of air, and in rooms heated by steam, (stove rooms,) the color turns more on the violet, and the product is called *red* archil; but when the manufacture is carried on in close vessels, the product is bluish, and hence called blue archil. In this way various shades of color are produced.

ARCHIL, LUMP. *Syn.* LITMUS. TURNSOLE. *Prep.* The archil plant, ground to powder, is moistened with urine, or bone spirit, and allowed to lie together for a few days, to ferment; a small proportion of chalk or gypsum is now added, and the whole is made up into small squares, (lump archil,) or preserved in the state of paste.

Remarks. When the ground lichen is mixed with about half its weight of pearlash before fermenting, and afterwards made with a small quantity of lime, it becomes quite blue, and is then called *litmus* or *turnsole.*

ARCHIL PAPER. *Syn.* LITMUS PAPER. I. (*Blue.*) *Prep.* Stain thin unglazed writing-paper with infusion of litmus; dry, and keep it from the light. *Use.* As a test for acids, which turn it red. *Remarks.* It should be of a *blue* color. Should the infusion of litmus turn a little on the violet, add a minute quantity of alkali (which will turn it blue) before wetting the paper.

II. (*Red.*) Add 2 or 3 drops of acetic acid to the infusion of litmus, or enough to turn it red; then stain the paper, as above. *Use.* As a test turned blue by alkalis.

Remarks. A convenient extemporaneous method of preparing this paper, is to take a strip of the blue litmus paper, and hold it for an instant over a bottle containing muriatic acid, which will turn it red. In this state it is very sensitive to alkalis. A good method of keeping these papers for use, is to cut them into strips about ½ an inch wide and 3 inches long, and to tie them up in bundles, or to keep them in a box of a similar size to the paper. They are then always ready for use, as well as excluded from the light.

ARCHIL, POWDERED. *Syn.* CUDBEAR. DYER'S ARCHIL. *Prep.* The bruised archil lichen is sprinkled with bone spirit and urine, and allowed to ferment for a few days in the open air, as before described, when it is dried and ground to a fine powder. *Use.* As a dye.

ARCHIL, TINCTURE OF. *Syn.* TINCTURE OF LITMUS. I. (*Blue.*) *Ing.* Litmus, in powder, 1 oz.; water and rectified spirit, of each, ½ pint. *Proc.* Digest for a week. *Use.* As a test. It turns red with acids.

II. (*Red.*) To the above add acetic acid, just

sufficient to tinge it red. *Use.* As a test; turned blue by alkalis.

Remarks. A very slight trace of either acids or alkalis may be detected in mineral waters, or saline solutions, by means of either the infusion or the tincture of litmus, or litmus paper. The latter is, however, the more convenient, and is that generally used.

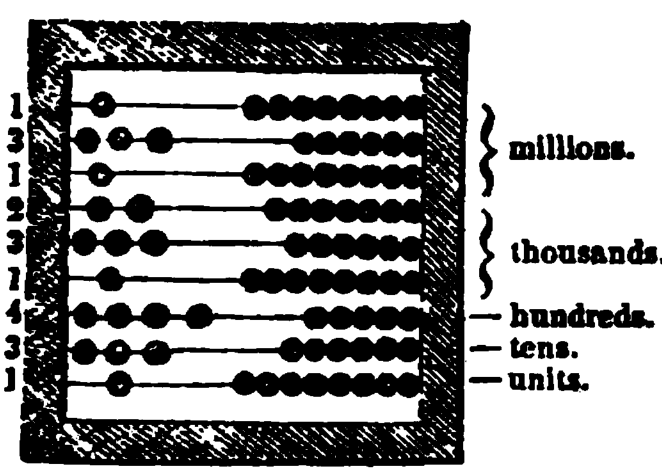
ARCÆUS, BALSAM OF. Mutton suet 4 parts; hogs' lard 2 parts; turpentine and rosin, of each, 3 parts. *Proc.* Melt, add 4 parts of hot water, and beat together until cold. *Remarks.* Once a noted ointment for sores and bruises.

ARICINA. *Syn.* Aricine. Cusconine. Cusco-cinchonia. An alkaline principle, discovered by Pelletier and Coriol, in the bark of the arica, or cusco-cinchona.

Prep. Boil the bark in water acidulated with sulphuric acid; repeat the process a second and third time; concentrate the mixed liquors, and precipitate with ammonia. Collect the powder on a filter, and purify by repeated resolutions and crystallizations from hot alcohol.

Remarks. It forms salts with the acids. It is supposed to be the teroxide of the base, of which quina is thought to be the binoxide and cinchona the monoxide.

ARITHMETER. *Syn.* Abacus. An instrument frequently employed in schools to teach young children the rudiments of arithmetic. Its construction is similar to the abacus of the Greek. The lines represent the nine digits, and progress from units upwards, as will be easily understood from the annexed figure, which has the number



131,231,431 on it, according to the common system of notation. Sometimes a small ball is suspended over the lines, which in that case adds *five* to the line below, and thus reduces the number of balls on each wire from 9 to 5.

ARNICINE. A resinous substance extracted by alcohol from the root and flowers of the mountain arnica. (Pfaff.)

ARRACK. A spirituous liquor, procured by distillation from palm-wine, or a fermented infusion of rice. It is imported from the East Indies, and much used to make punch. When sliced pine apples are placed in arrack, and the spirit kept for some time, it acquires a most delicious flavor, and is thought to be unrivalled for making nectarial punch.

ARRACK, FACTITIOUS. *Syn.* Mock Arrack. Vauxhall Nectar. *Prep.* Dissolve 23 grs. of flowers of benzoin (benzoic acid) in 1 quart of good pale Jamaica rum. *Sold for arrack.*

ARROW ROOT. A very pure and nutritious species of starch, prepared in the West Indies from the root of the maranta arundinacea.

Pur. The mass of what is sold for arrow root, in the shops, consists either wholly or in part of the fecula or farina, obtained from potatoes, and commonly called potato starch. This article is known in the trade as "*British arrow root,*" or simply "*arrow root,*" whereas, the genuine kind is always described as "*Bermuda,*" "*St. Vincent,*" "*St. Kitts,*" or at least as "*West Indian arrow root.*" The mere addition of an adjective is no proof of quality, and no sample should be bought without a proper examination. Arrow root is imported in tin canisters or cases, and in boxes and casks, but the former is most esteemed.

Tests, &c. Genuine arrow root is odorless and tasteless, and produces a sort of crackling noise when pressed or rubbed, and emits no peculiar odor when mixed with muriatic acid. Stirred up in a mortar with double its weight of a mixture of equal parts of aquafortis and water, it does not become gelatinous and adhesive in less than 15 minutes. (Dr. Scharling.)

ARROW ROOT, EAST INDIAN. *Source.* The roots of the curcuma angustifolia. *Char.* A white powder, somewhat resembling bicarbonate of soda or rochella salts. It does not crepitate between the fingers like West Indian arrow root.

ARROW ROOT, BRAZILIAN. *Syn.* Tapioca Meal. *Source.* The cassava plant. *Char.* Partially soluble in cold water; appearance inferior to W. I. arrow root; grains, mullar-shaped, when viewed by the microscope.

ARROW ROOT, ENGLISH. *Syn.* Farina. Potato Starch. *Source.* The esculent potato.

Char. I. When mixed with muriatic acid, a smell resembling fresh beans or rushes may be perceived. (Ann. Chem.)

II. One drachm of potato starch rubbed in a mortar, with a mixture of one drachm of aquafortis, previously diluted with 1 drachm of water, forms rapidly a very stiff and tenacious jelly. 5§ of potato starch, mixed with West Indian arrow root, may be detected in this way. (Scharling.)

ARROW ROOT, PORTLAND. *Source* The tubers of the arum maculatum, or wake-robin. *Char.* It resembles the Brazilian arrow root, mentioned above.

Remarks. By attention to the characteristics of each of the above varieties, the purity of any sample may be easily ascertained. The grains of each variety have a different appearance when viewed by the microscope, but when the sophistication takes place before grinding, the original form of the grains of each is lost, and this method of examination is then useless. The reader is referred, for further information on this subject, to Dr. Pereira's excellent work on Materia Medica, where he will find the subject fully explained and illustrated by engravings, from the pencil of the doctor's talented lady, representing the appearance of the magnified grains.

ARSENIATES. Salts formed of the arsenic acid and the bases. They are all poisonous. Most of the metallic arseniates may be made by adding a soluble salt of the metal to a solution of the acid, when the arseniate is precipitated.

ARSENIATE OF AMMONIA AND SODA, DOUBLE. *Prep.* Mix the separate solutions of the arseniate of soda and ammonia, evaporate and crystallize. *Poisonous.*

Remarks. In a similar way are made the double arseniates of soda and potassa, and of ammonia and potassa.

ARSENIATE OF BARYTA. *Prep.* Add a solution of chloride of barium to another of arseniate of potassa or soda; collect the precipitate and wash it well. *Remarks.* By dissolving this salt in a solution of arsenic acid and crystallizing, a biarseniate of baryta is obtained.

ARSENIATE OF POTASSA. *Prep.* Saturate a solution of the acid with potassa. Uncrystallizable.

ARSENIATE OF POTASSA, (SUPER- OR BI-.) *Syn.* ARSENIATED KALI. MACQUEER'S NEUTRAL ARSENICAL SALT. *Prep.* Heat together equal weights of nitre and arsenious acid; dissolve the melted mass in water, evaporate and crystallize.

Prop., Uses, &c. This salt is obtained in large crystals. It is tonic. *Dose* $\frac{1}{16}$ to $\frac{1}{4}$ of gr.; used in making cobalt blue.

Remarks. By a similar process to the above, the arseniates of lime and magnesia may be made. This salt (potassa) is made on a very extensive scale in Saxony.

ARSENIATE OF SODA. Saturate a solution of arsenic acid with another of carbonate of soda; evaporate and crystallize.

ARSENIATE OF SODA, (SUPER OR BI-SALT. *Prep.* Heat together in a crucible or bolthead, a mixture of 9 oz. of white arsenic with 1 lb. of dry nitrate of soda, until all the nitric acid be expelled. *Dose.* $\frac{1}{8}$ to $\frac{1}{6}$ gr.

ARSENIC. *Syn.* METALLIC ARSENIC. REGULUS OF ARSENIC. BLACK ARSENIC. A brittle, inflammable, volatile, and combustible metal, the base of white arsenic or arsenious acid.

Prep. I. Mix white arsenic in powder with twice its weight of black flux, and expose the mixture to a red heat, in a Hessian crucible, over which is luted an empty crucible to receive the metal. The upper one must be kept cool.

II. Mix white arsenic with twice its weight of soft soap, and fuse it in a crucible, with a very quick fire; pour the melted metal into inverted hot iron cones.

Remarks. The first is the more convenient process. *Caut.* Too much care cannot be taken to avoid inhaling the fumes; the process should be conducted only where there is a strong current of air to carry them off. On the large scale it is procured by distilling white arsenic with charcoal and iron, or lime. *Use.* To whiten copper, and in medicine.

ARSENIC, BROMIDE OF. *Syn.* SESQUIBROMIDE OF ARSENIC. *Prep.* Add dry arsenic in powder, cautiously, and in small quantities at a time, to bromine, as long as light continues to be emitted, then distil into a cool receiver. (Serullas.) *Prop.* Solid below 68°, boils at 428°. When liquid it is yellowish. *Poisonous.*

ARSENIC, PROTOCHLORIDE OF. *Prep.* Mix in a tubulated retort 1 part of arsenious acid, and 10 parts of strong sulphuric acid; heat to 212°, and throw in gradually small quantities of sea salt. Collect the chloride in a well-cooled receiver. (Dumas.) *Remarks.* The pure protochloride swims on a little hydrated portion when the process has been too long continued. The latter may be rendered anhydrous by distillation from strong sulphuric acid.

ARSENIC, SESQUICHLORIDE. *Syn.* CHLORIDE OF ARSENIC. BUTTER OF ARSENIC, FUMING LIQUOR OF DITTO. *Prep.* I. Distil together 6 parts of corrosive sublimate and 1 of arsenic. II. Boil muriatic acid, mixed with a little nitric acid, upon arsenic for some time, then concentrate and distil, (if required.)

Remarks. All the above are poisonous, corrosive, and volatile.

ARSENIC, IODIDE OF. *Syn.* PERIODIDE OF ARSENIC. *Prep.* Gently heat together in a tube or flask, 1 part of metallic arsenic in fine powder, with 6¼ parts of iodine, then sublime the iodide to separate the excess of arsenic. A sand-bath or the heat of a spirit-lamp should be employed for this purpose. *Prop.* An orange-red solid, volatile and soluble in water. *Dose.* $\frac{1}{8}$ to $\frac{1}{4}$ of gr. in lepra, lupus, psoriasis, impetigo, &c.

ARSENIC, OINTMENT OF IODIDE OF. (BIETT.) *Prep.* Mix well together 3 grs. of iodide of arsenic and 1 oz. of lard. *Use.* In corroding tubercular diseases.

ARSENIC, RED SULPHURET OF. *Syn.* PROTOSULPHURET OF ARSENIC. RED ARSENIC. REALGAR. This substance is found ready formed in nature, but it may also be produced by art.

Prep. Powdered white arsenic 2 parts, flowers of sulphur 1 part. *Proc.* Heat them together in a crucible, until in a state of perfect fusion.

Prop. Transparent ruby red-colored mass. *Very poisonous. Uses.* As a pigment and in fireworks. Not used in medicine. Its color is improved by sublimation in close vessels.

ARSENIC, YELLOW SULPHURET OF. *Syn.* SESQUISULPHURET OF ARSENIC. YELLOW ARSENIC. SULPHOARSENIOUS ACID. ORPIMENT. KING'S YELLOW. This sulphuret, like the last, is found ready formed in nature, and was once called auripigmentum, from its fine color.

Prep. I. Mix together equal parts of sulphur and arsenious acid, and sublime in a close vessel.

II. Transmit a current of sulphureted hydrogen gas through a solution of arsenious acid; collect the precipitate and well wash it in cold water.

Prop. Yellow crystalline lump, or fine golden yellow powder; very soluble in the pure alkalis.

Uses. As a dye, a pigment, in fireworks, and in some depilatories. Silk, woollen, or cotton goods, soaked in a solution of this substance in ammonia, and then suspended in a warm apartment, are permanently dyed of a beautiful yellow color. The native sulphurets (both red and yellow) are much less soluble than those prepared artificially, and are consequently less poisonous. The native varieties possess the finest color, and are hence preferred by artists. If sulphureted hydrogen be transmitted through a solution of arsenic acid, a persulphuret is formed which much resembles orpiment.

ARSENICAL CAUSTIC. (JUSTAMOND'S.) *Prep.* Melt together 2 parts of white arsenic and 1 part of antimony; when cold reduce the mass to a fine powder.

Remarks. A poisonous and dangerous escharotic, employed by M. Justamond, mixed with powdered opium, in cancer. It is seldom used in England.

ARSENICAL SOLUTION *Syn.* (Dr. DE-

VERGIE'S MINERAL SOLUTION.) *Prep.* Arsenious acid (crystallized) 0·10 centigramme; carbonate of potassa 0·10 centigramme; distilled water 500 grammes; compound tincture of melissa 0·50 centigramme; tincture of cochineal to a deep rose color. *Proc.* Dissolve the acid and potassa in the water, (hot,) and when cold add the rest.

Remarks. Each gramme is equal to $\frac{1}{5000}$ of arsenious acid, or $\frac{1}{36}$ of the strength of Fowler's solution. *Used* in similar cases to the solution of arsenite of potassa of the L. Ph., over which it is said to possess the advantages of greater convenience and safety in dispensing.

ARSENIC ACID. An acid formed by the combination of metallic arsenic with oxygen. *Hist.* The combinations of this acid were noticed by Macqueer, but we are indebted to Scheele for the subsequent discovery of the acid.

Prep. Pour 6 parts of strong nitric acid on 1 part of white arsenic in a glass vessel, and distil until the solution acquires the consistence of a sirup, then transfer it into a platina crucible, and expose it for some time to a faint dull red heat, to expel the nitric acid. *Remark.* The addition of a little muriatic acid facilitates the process. (Liebig.)

II. Submit arsenious acid to the action of aqueous chlorine.

Prop. Sour, reddens litmus, dissolves in 6 times its weight of cold water, (twice its weight, Lagrange,) and less of boiling, and forms salts with the bases, called arseniates. By careful evaporation it may be obtained under the form of small grains, but as usually met with has the consistence of sirup. It is deliquescent.

Use. It has not been employed in medicine, or the arts, but indirectly some of its combinations have been used in dyeing. It is a *more* violent poison than even the arsenious acid. (Brodie.)

Tests. Sulphureted hydrogen gives a yellow precipitate; nitrate of silver added to the solution of an arseniate, gives a precipitate of a brick red color; nitrate of lead gives a *white* one, and the salts of copper a bluish colored one. Pure lump sugar dissolved in an aqueous solution of arsenic acid, becomes in a few hours of a reddish color, and afterwards of a magnificent purple. (Ure.) This acid, whether free or combined, is reduced to the metallic state, and evolves a garlic odor when heated with charcoal. Wohler recommends the addition of sulphurous acid to the suspected liquor, and to boil it for a short time, when the arsenic acid will be reduced to arsenious acid, in which state it will be more susceptible of tests. See the next article.

ARSENIOUS ACID. *Syn.* WHITE ARSENIC. OXIDE OF ARSENIC. ARSENIC BLANC. ACIDE ARSENIEUX. (*Fr.*) ARSENICHSTE SAURE, GIFT MEHL. (*Ger.*) ACIDUM ARSENIOSUM. (P. L.) *Hist., Des., &c.* This substance, like the preceding, is a compound of metallic arsenic and oxygen, and is a powerful poison; in fact, one of the most virulent of the class to which it belongs. It is commonly known by the simple title of "*arsenic*," a term derived from the Greek, ἀρσενικόν, an epithet once applied to those natural substances which possess strongly poisonous and acrimonious properties; as orpiment was the usual form under which arsenic occurred, it consequently received the name, and hence this word has gradually been altered to its present application. (Paris.) Scheele first proved the white arsenic of the shops to consist of a metal and oxygen, but Fourcroy gave it the name of arsenious acid.

Source. The white arsenic of commerce is principally imported from Germany, where it is obtained in the process of roasting the arsenureted cobalt ores for making zaffre. At Altenburg it is procured from arsenical iron pyrites, and at Riechenstein from the sesquiarseniate of iron. About 600 to 800 tons are also annually collected in Cornwall, being a secondary product of the process of roasting the gray copper ores and white mundic. The crude article obtained in this way has to be purified by sublimation in suitable iron vessels, before it is fit for sale. It then forms a semi-transparent vitreous cake, which gradually becomes opaque, and of a snowy whiteness by exposure to the air, and *sometimes* falls into a pulverulent state on the surface. The powdered white arsenic of the shops is generally adulterated with plaster of Paris, white sand, or ground bone ashes, and is totally unfit for the purposes of chemistry or the manufacturer. To avoid this fraud, the best way is to purchase it in the lump, which will generally be found sufficiently pure. When wanted *very pure*, it may be resublimed in glass.

Prop. Volatilizes at 380° Fahr. Vapors smell of garlic; sp. gr. 3·7. Its taste is usually thought to be acrid, but this is not the case. It may be deliberately tasted without exciting more than a very faint impression of sweetness, and perhaps slight acidity. (Turner.) I can say from painful experience that such is the case. Hence its dangerous character as a poison. 100 parts of boiling water dissolve 8 parts of arsenious acid, (Bucholz and Klaproth;) but on cooling to 60° only 3 parts remain in solution. The opaque variety is the more soluble. (Guibourt.)

Uses. Extensively employed in the arts, and in medicine. In small therapeutical doses it is a valuable remedy in intermittent fevers, chronic skin diseases, (especially lepra and psoriasis,) and in some nervous diseases, (as neuralgia, epilepsy, chorea, tetanus, &c.) It is the active ingredient in the "*tasteless ague drop*," and the Tanjore pills, long celebrated in India for the cure of the bite of the cobra di capello, and other venomous serpents, as well as hydrophobia. It has been given in syphilis, chronic rheumatism, typhus, and several other diseases, with more or less advantage. Externally it has been employed in the form of powder, lotion, and ointment for the cure of cancer. Its use, whether internal or external, is always attended with danger, and should never be adopted without proper advice. It even proves destructive to vegetable life, (Jäger, Marcet, Macaire.) *Dose.* In substance, made into pills with crumb of bread and lump sugar, $\frac{1}{16}$th to $\frac{1}{8}$th of a grain, or in solution, (the liq. of arsenite of potassa, P. L.) 4 to 5 drops, 2 or 3 times daily, gradually and cautiously increased to 10 or 15 drops.

Pur. 1. It should wholly volatilize by heat. 2. 5 grs. boiled in 1 oz. of water should dissolve without leaving any residue. 3. Mixed with half its weight of black flux, and heated, it should sublime with the production of a garlic odor, and leave an ash behind, perfectly soluble in distilled water.

ARSENIOUS ACID, TESTING FOR. *Memo.* For the sake of brevity and convenience of reference, I shall describe the usual tests for arsenic, in alphabetical order, appending such remarks to each, as will render their application quite simple, even to persons but partially conversant with chemical manipulations.

I. *Ammoniacal acetate of copper* in a state of weak solution, gives a fine grass-green and very characteristic precipitate of arsenite of copper, or Scheele's green. This precipitate, well washed, and acted on by sulphureted hydrogen water, turns brownish-red; prussiate of potash turns it blood-red, and nitrate of silver yellow.

Susc. $\frac{1}{110000}$. (Ure.)

II. *Ammoniacal nitrate of silver. Syn. Hume's test.* A solution of this test, added to an aqueous solution of arsenious acid, gives a yellow precipitate of arsenite of silver. This precipitate is soluble in liquid ammonia, nitric acid, and in a solution of nitrate of ammonia.

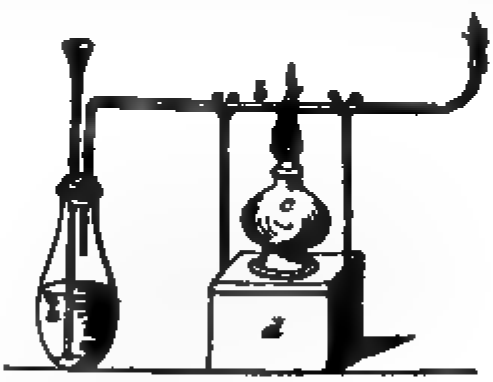
Susc. $\frac{1}{150000}$. (Devergie.)

Remarks. This test, when properly prepared, yields a yellow precipitate with no known substance save arsenious acid. It is usually said to be inapplicable to solutions containing sulphate or muriate of soda, or chlorine; but Dr. Ure declares that these substances do not interfere with the test if it be used in the following manner:—Dip a small glass rod into liquid ammonia, and then plunge it into the fluid under examination; dip another glass rod into a solution of pure nitrate of silver, and plunge this also into the sample, when either a fine yellow cloud will be formed, or at first merely a white curdy precipitate. After a second or third immersion of the nitrate rod, a central yellow spot will be perceived, surrounded with the white chloride of silver; and after another immersion the yellow cloud on the surface will become very evident. Another modification of this process is, to drop a little of the suspected fluid on white writing-paper, and to draw several times over it a stick of lunar caustic; if arsenic be present it will leave streaks that will assume a bright yellow color when brushed over with liquid ammonia; if the contrary be the case they will gradually fade and turn black. (Dr. Paris.)

III. *Ammoniacal sulphate of copper.* A dilute solution of this salt, added to another containing arsenious acid, gives a green precipitate of arsenite of copper.

Susc. $\frac{1}{5000}$. (Devergie.)

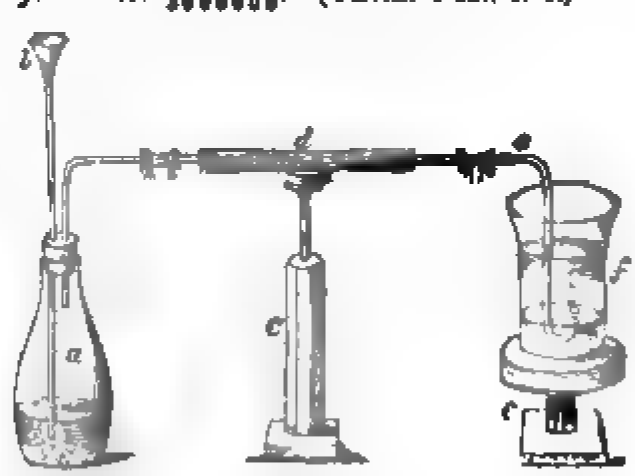
IV. *Ellis's Test.* This consists in forming arseniureted hydrogen gas in a Marsh's apparatus, or even in a common flask, and passing it through a horizontal tube containing slips of copper-leaf or riband, and having the one end drawn to a capillary size, at which the gas may be inflamed and tested. (See fig. below.) This is not, however, the object of the test, as will be presently seen. A small spirit-lamp must be placed under that part of the tube containing the copper, so as to render it warm, when, if arsenic be abundant in the gas, the copper will almost instantly become frosted over with a coating of metallic arsenic. After continuing the heat for a few minutes the lamp may be withdrawn. The copper on being removed from the tube will present a beautiful silvery surface, and may then be submitted to further examination. (See *Reinsch's Test*, p. 77.) The slips of copper are directed to be prepared for this purpose by heating them in a clear fire to a dull red, and then throwing them suddenly into cold water; when wiped dry they are ready for being placed in the horizontal tube for testing.



a, Flask containing the suspected fluid, dilute sulphuric acid, and zinc.
b, Portion of tube holding slips of copper.
c, Spirit-lamp.
d, Support.

Remarks. Mr. Robert Ellis has since found that the oxide of copper may be employed in the same way, and possesses some advantages over the metal. *Susc.* About $\frac{1}{500000}$.

V. *Lassaigne's Test.* (*Adopted by the French Academy.*) This consists in passing the arseniureted hydrogen, generated in a flask or Marsh's apparatus, through a solution of nitrate of silver. (See eng.) Black flocculi of metallic silver are deposited, and arsenious acid remains in solution mixed with nitric acid. A little dilute hydrochloric acid must now be added to precipitate any remaining nitrate of silver, when the liquid, after filtration, may be tested for arsenic in the usual way. *Susc.* $\frac{1}{2000000}$. (Chem. Gaz., I. 6.)



a, Bottle containing dilute sulphuric acid, zinc, and suspected fluid.
b, Funnel for supplying the bottle with acid.
c c, Supports.
d, Tube filled with asbestos.
e, Bent tube to convey the liberated gas.
f, Glass vessel containing a solution of nitrate of silver.

VI. *Lime Test.* Lime water occasions a white precipitate of arsenite of lime in a solution of arsenious acid, soluble in most acids, and in an excess of the arsenious solution. *Susc.* $\frac{1}{4000}$. (Devergie.) It is inapplicable when acids, oxalates, tartrates, or carbonates are present.

VII. *Marsh's Test. Syn. Arseniureted hydrogen test.* This test consists in the production and subsequent decomposition of arseniureted hydrogen. The principle of its action depends on

the property possessed by nascent hydrogen, of taking the metal from a solution of arsenious acid. The process is as follows: Some of the suspected liquid is mixed with dilute sulphuric acid and poured upon some pieces of zinc previously placed in the apparatus; hydrogen gas is immediately evolved, and if arsenic be present unites with it, forming arseniureted hydrogen gas, which may be recognised as follows:—

1. It possesses a garlic-like smell.

2. It burns with a bluish-white flame, and emits a whitish smoke.

3. When a piece of window-glass, or a white porcelain plate or saucer, is held a short distance *above* the flame, arsenious acid, under the form of a fine pulverulent film, is deposited thereon.

4. When the plate is held *in* the flame, a blackish deposite of metallic arsenic acid is obtained.

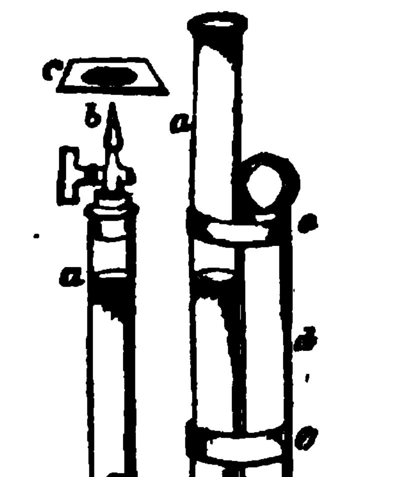
₄ Both these deposites may be obtained simultaneously by holding nearly vertically over the flame a glass tube 8 or 10 inches long, and $\frac{3}{8}$ths of an inch in diameter.

5. A solution of arsenious acid may be obtained by letting the flame play upon 3 or 4 drops of water, placed on the under side of the piece of glass or china, to which the liquid tests may be then applied. Another plan is to apply drops of the liquid tests to the plate as above, and to let the flame play on them successively.

6. The true arsenical spot is soluble in nitric acid, and gives with nitrate of silver a dull red precipitate; and when heated is turned reddish-brown by the action of sulphureted hydrogen.

7. When a tube through which the gas is made to pass is raised to a dull red heat at a certain part by means of a spirit lamp, a crust of metallic arsenic is deposited beyond the flame, on the cooler portion of the tube. The glass of which the tube is made should be of the most infusible kind. The mode of conducting this experiment is represented in the eng. at p. 76, omitting the copper wire.

Remarks. Care should be taken not to light the jet of gas before all the air is expelled from the apparatus, as without this precaution an explosion may take place. The following figure represents



a a, Bent glass tube, containing dilute sulphuric acid, zinc, and suspected fluid.
b, Stopcock and jet.
c d, Support.
e e, Bands to keep the tube upright.
f, Plate of glass to receive the stain.

the usual form of Mr. Marsh's apparatus, as well as the mode of its application in analysis; but a simple wide-mouthed bottle, furnished with a tube and cock, will answer quite as well or better, as the fluid is less liable to froth than in a narrow tube. Even a common medicine-vial, furnished with a tobacco-pipe for a burner, may be used when no more convenient apparatus is at hand.

Some objections have been raised to this mode of testing, from the great frothing which occurs in organic mixtures, and from antimony and imperfectly charred organic matter also forming crusts somewhat resembling those produced by arsenic. But this objection is invalid, because there are easy means of discriminating between true arsenical spots or deposites and false ones. (See the *Reduction Test*, p. 78.) Another objection is, that both zinc and sulphuric acid sometimes contain arsenic; but this is frivolous, as it only becomes necessary to observe that the substances employed be perfectly pure, which may be proved by testing the hydrogen evolved from the apparatus, before adding the liquid for examination.

Susc. $\frac{1}{1000000}$. (Commissioners of the French Academy;) $\frac{1}{5000000}$. (Mohr.;) weak traces at $\frac{3}{50000000}$. (Ann. der Chem. und Pharm.;) the $\frac{1}{150}$ of a grain. (Dr. Thompson.) It may be observed that the 7th, and 3d, or 4th method of using Marsh's apparatus, may be employed simultaneously; the former possesses the advantage of not requiring constant attention. Lassaigne's and Ellis's tests are modifications of Marsh's.

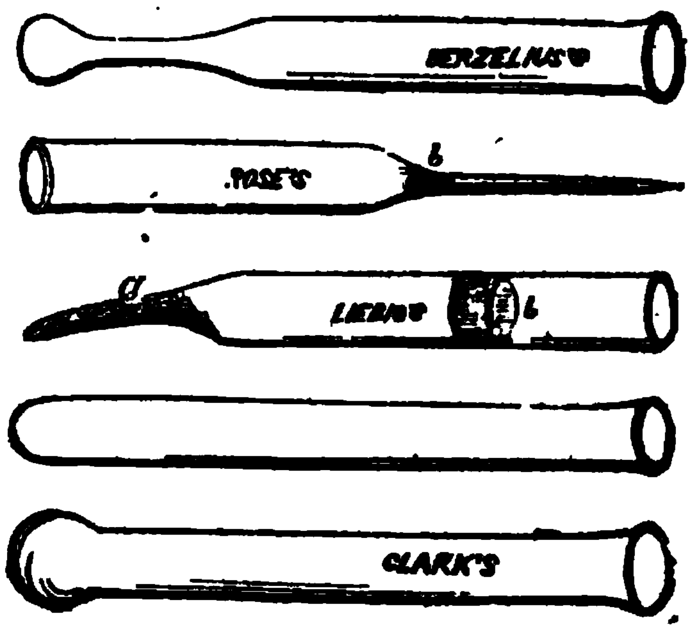
VIII. *Morton's Test.* This consists in immersing in the suspected fluid two platina plates, connected with the poles of a good galvanic battery. The hydrogen liberated at the negative electrode must be collected and examined in the same way as described in the last article. *Remarks.* The advantage of this apparatus is, that it obviates the use of zinc and sulphuric acid, and thus prevents the introduction of arsenic by either of those substances. This advantage is, however, rather *apparent* than *real*, as, with proper care, such need never be the case. *Susc.* $\frac{1}{10000}$. (Morton.)

IX. *Rensch's Test.* *Syn.* *Cupro-arsenical test.* If arsenic is contained in any acid, as, for instance, in phosphoric, sulphuric, acetic acid, &c., and this be boiled with metallic copper, the latter will remain perfectly bright; an aqueous solution of arsenious acid ($As^3 O^3$) likewise does not readily act on copper; if, however, a few drops of concentrated muriatic acid be allowed to run over the surface of the sheet of copper, the liquid being still hot, the copper will be instantly covered with the characteristic iron-gray film of arsenic.

A solution, diluted to 100,000 times, was prepared from another solution of arsenious acid, diluted to $\frac{1}{1000}$; these were mixed, with the utmost precision, with equal parts of concentrated and perfectly pure muriatic acid and distilled water, and different test liquids made with the former, until diluted to $\frac{1}{1000000}$ of its contents. By diluting with 500,000 parts of water, containing, therefore, $\frac{1}{1000000}$ of a grain of arsenic, the copper plate, after the liquor previously boiled had been allowed to stand for half an hour, was for the greater part covered with an extremely thin but

perceptible film of arsenic. As a controlling experiment, a perfectly similar plate was treated with dilute muriatic acid alone; this remained, however, quite unchanged; but it must be observed, that in the case of the copper remaining for several hours in the liquor under the influence of the atmosphere, it becomes covered with a black hue, perhaps an undissolved chloride of copper; this, however, can never cause misconception, since, if arsenic be really contained in the liquor, it will be completely precipitated after the lapse of half an hour, during which space of time metallic copper preserves its lustre in the acid liquor. In masticated food, taken from the contents of the stomach and bowels, arsenic may be as easily detected; they have only to be digested with dilute muriatic acid, and treated with a plate of copper. In order to detect the arsenic by another process, the copper plate must be rinsed with water, carefully dried over a flame, and then placed in a tube 15 inches long, and drawn out to a point at one extremity; a small bent tube, provided at the end with a pierced cork, being hermetically adapted thereto. The place where the copper plate lies must then be heated by the spirit-lamp, when the arsenious acid will sublime in small but perceptibly glittering crystals. If the point be then closed by fusion, the arsenious acid may be examined as such, or it may be dissolved in muriatic acid, and tested with nitrate of silver and sulphureted hydrogen, or in Marsh's apparatus. If it be intended to obtain metallic arsenic, and not arsenious acid, the small tube must be connected with a hydrogen apparatus, and heated. The arsenic will then deposite in its metallic form on any cold object. (Sächsisches Gew. Bl.)

Remarks. The suspected liquor should be kept perfectly acidulous during the whole period of the ebullition; "f℥ij of muriatic acid, to ℥viij of the liquid, are generally sufficient, but if the organic matter be an animal texture in a state of decay," a much larger quantity will be required. (Christison.) Copper leaf cut into small strips is the most convenient form of using that metal. When the quantity of arsenic in the suspected fluid is supposed to be small, nearly half an hour should elapse before the copper should be removed. (Christison.) By means of this test, Dr. Christison discovered arsenic in the stomach 4 months after interment. *Succ.* $\frac{1}{1000000}$. (Rensch.)



a, The arsenical mixture.
b, Arsenical ring.

X. *Reduction Test.* If arsenious acid be well mixed with an equal weight of newly-burnt charcoal, or half its weight of black flux, and the mixture be placed at the bottom of a small glass tube, and heated in the flame of a spirit-lamp or candle, metallic arsenic will sublime, and on reaching the cooler portion of the tube, again condense, in the form of a metallic crust or ring. Any common test-tube, of small diameter, may be employed for this purpose, but the reduction-tube of Berzelius is perhaps the most convenient. Care must be taken, whatever shaped tube may be used, to avoid soiling its sides in the operation of inserting the mixture; as, unless the tube be quite clear and dry, the experiment will not succeed. The preceding figures represent the kind of tubes generally used in this method of testing.

The metallic ring, or crust, is proved to be arsenical,—1, by the brilliancy of its outer surface often resembling a polished steel mirror.

2. The crystalline and grayish-white appearance of its inner surface.

3. Its volatility when heated, shown by its escaping from the hot portion of the tube and resting on the cooler part, further on.

4. Its conversion into minute octohedral crystals of arsenious acid, when repeatedly chased up and down the tube, by the cautious application of the flame of a spirit-lamp, first to one part, and then to another. This is best effected by holding that part of the tube to which the arsenic adheres, about $\frac{1}{4}$ of an inch above the flame, and in such a way that the metal may be slowly sublimed. The character of these crystals, with respect to volatility, lustre, transparency, and form, is so exceedingly well marked, that a practised eye may safely identify them; though their weight should not exceed the $\frac{1}{100}$ part of a grain. (Liebig and Gregory.) The form of the crystals is very evident with a microscope of 4 powers, (200, Wackenroder.) The oxide of antimony never forms octohedrons, but only prisms. (Wackenroder.) The tube is of course broken for this purpose.

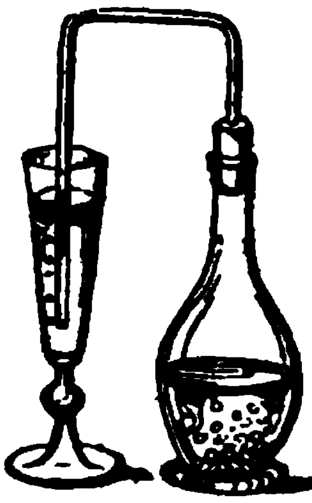
5. The film being converted into arsenious acid as in the last case, may be dissolved in hot distilled water, and tested by any of the usual chemical reagents.

Remarks. The above characteristics will fully show the nature of the film deposited in the reduction-tube. In operating in this way it is always necessary to heat the upper portion of the mixture *first*, and then to expose the bulb or bottom of the tube to the full flame. Any substance containing arsenic may be tested in this way, but if it be a sulphuret, the black flux must be employed, as charcoal alone is insufficient. This test is usually regarded as *decisive*, as we here actually obtain the arsenic in a *solid form*, which may be recognised by the *most unequivocal characters*.

XI. *Sulphureted Hydrogen.* This substance, passed through a solution of arsenious acid, immediately changes it to a yellow color; a turbidness shortly ensues, and a bright yellow precipitate of sesquisulphuret of arsenic or orpiment subsides after heating the liquid, and may be collected on a filter. It is necessary to acidulate the fluid with acetic or hydrochloric acid before applying the test, unless it be already very sour, when it should be first neutralized by an alkali, and then acidulated.

The transmission of the gas should be continued for at least half an hour. The precipitate is known to contain arsenic: 1, From its yellow color; 2, its solubility in liquid ammonia forming a colorless solution; and, 3, by yielding metallic arsenic when mixed with the black flux and submitted to the reduction test.

Remarks. When the sulphuret is very small in quantity, it is better to wash it in a little water, and to dissolve it in liquid ammonia, which may be then driven off in a watch-glass or capsule, after which it may be tested as before. (Devergie.) The engraving represents the mode of executing this test.



Mode of passing sulphureted hydrogen through an arsenical solution.

XII. *Voltaic Test.* The voltaic battery, made to act by two wires on a little arsenious solution, placed on a piece of window glass, developes metallic arsenic at the negative pole, and if the wire be formed of copper, it will become whitened and polished like silver, in consequence of the formation of a tombac alloy.

XIII. *Wollaston's Method* was to concentrate, by heat, in a capsule, a little of the suspected liquid, having previously filtered it if necessary, then to place it in the middle of a bit of window glass, and to draw lines with the fluid in different directions, so as to form a starlike figure. To one of these a particle of weak solution of ammoniacal nitrate of silver was added; to another ammoniacal acetate of copper; to a third the deuto-acetate of iron; to a fourth ammonio-acetate of cobalt; sulphureted hydrogen to a fifth, and lime-water to a sixth; a drop of sirup of violets to a seventh, and the two wires of a galvanic battery to the opposite edges of the whole. Thus with one drop of solution many exact experiments may be made. (Ure.)

General Remarks. *Detection of arsenic in organic mixtures, &c.* Most of the previous tests are only applicable, *with any degree of certainty*, to pure solutions of arsenious acid, or to those that are but *slightly* colored or contaminated with organic matter. The tests depending on the extrication of arseniureted hydrogen are *partial* exceptions to this rule; but even in them, if the suspected liquid be not *nearly limpid*, so much frothing will ensue as to render the process impracticable. In this respect Rensch's test, perhaps, possesses the advantage over the rest, as it may at once be applied to mixtures containing organic matter, without the latter undergoing any previous preparation. The reduction test is only applicable to solid arsenious acid, or to some of the compounds of arsenic which are obtained by means of the other tests. It has long been an object with chemists to remove organic matter from solutions, so as to render them sufficiently clear, light colored, and limpid, to permit of the action of reagents. Various means have been proposed for this purpose, some of which I shall notice below. Suppose a case of poisoning, the proceeding should be as follows:—The stomach being laid open, an examination should be made for any particles of powder which it may contain in an undissolved state; if any can be found they must be collected and tried by the reduction test as before described. Should no solid particles be discovered, the stomach should be cut into small pieces, and with its previous contents be boiled in a glass vessel with distilled water for half an hour, a little potassa or ammonia being added. The liquid may now be filtered, first through muslin and then through paper, and again boiled with a little acetic acid, after which it must be filtered a second time. In this state the liquid is usually clear enough to be tested with the ammonio-nitrate of silver, when, if this test act freely, the process of testing with other reagents may be proceeded with; but if, on the contrary, the indication be feeble, the liquor should be gently evaporated to dryness, and redissolved by boiling in repeated portions of distilled water, when, after being once more filtered, it will generally be sufficiently limpid for the perfect application of the tests. (Christison, Devergie.)

It has been recommended to add to the organic matter contained in a porcelain capsule, one-sixth of its weight of strong, *pure* sulphuric acid, and to heat the mixture until vapors of the acid begin to appear, constantly stirring with a glass rod during the whole time; the heat is to be continued until the charcoal thus formed becomes friable, and almost dry, when it must be cooled a little, and strong nitric or nitro-muriatic acid added by means of a pipette; the evaporation must then be continued to dryness. The residuum boiled with distilled water, and the solution filtered, will be ready for testing. (Danger and Flandin.)

Another plan is to boil the suspected fluid containing organic matter, with *pure* diluted sulphuric acid, until it becomes limpid, and then to filter, when the usual tests may be applied. (Fownes.) When there is much gelatine in the liquid it may be got rid of by adding an infusion of nut-galls, which will precipitate it. (Fownes.)

The last plan I shall mention is that of evaporating the suspected liquid to dryness, and then submitting it to the reduction test.

The following tables, taken from the "London Dispensatory," showing the reaction of several reagents on various organic solutions containing poison, will, in many cases, save the trouble of preparing the fluid previously to testing; or at least they offer a ready means of confirming the truth of any more exact method of analysis.

Comparative Table of the Precipitates obtained from Solutions of Arsenious Acid, of Bichloride of Mercury, of Potassio-Tartrate of Antimony, and of Chloride of Barium, with different Tests.—By Dr. A. T. Thomson.

TEST I.—WATER SATURATED WITH SULPHURETED HYDROGEN GAS.

Solvents.	Precipitates from Solutions of Arsenious Acid.	Precipitates from Solutions of Corrosive Sublimate.	Precipitates from Solutions of Tartar Emetic.	Precipitates from Solutions of Chloride of Barium.
Water ...	Bright lemon yellow, deepened by the addition of a few drops of strong acetic acid.*	Yellow at the instant of its formation, but soon becoming blackish.—On shaking the tube it changes to a dirty white.	Orange, curdy, partly suspended, partly thrown down. Ultimately bright orange.‡	Heavy, and of a dirty dark brown color.
Broth	Scarcely any at first, but on adding a few drops of strong acetic acid, a pale yellow.	Whitish yellow at first, quickly changing to mixed clots of yellow, black and white.	Pale orange at first, soon changing to a deeper bright orange.	Dirty pale brown, heavy.
Milk	Little change; but on the addition of a drop of strong acetic acid, a straw-colored precipitate.	Light ochre, requiring for its formation a large quantity of the test.	Golden yellow, with a shade of orange.	Dirty nankeen, with a shade of brown.
Tea	At first very pale yellow; after some time, a pale greenish yellow. The precipitate was curdy.†	Brownish white and yellow, mixed.	Deep orange, curdy, slowly formed: the supernatant fluid yellow.	Dirty light brown, deepening as it fell.
Madeira Wine	Turbid, pale yellow, the color of the wine destroyed.	Muddy, gradually displaying small floating black flocculi.	Pale orange, long suspended.	The chloride mixed with white wine is milky. Not tested.
Port Wine	Turbid, pale yellow; the precipitate slowly formed.	Nearly as in the white wine, like clouds through the purple of the wine.	Dark, dirty, orange brown.	Pale brown, heavy.
Coffee ...	A deep golden yellow.	Brownish black.	Deep orange-brown.	Not tested.
Gruel	Pale yellow, suspended.	Light brown, slowly formed.	Pale orange.	Not tested.

II.—SOLUTION OF SULPHURET OF POTASSIUM.

Solvents.	Arsenious Acid.	Corrosive Sublimate.	Tartar Emetic.	Chloride of Barium.
Water....	White, with a faint tint of sulphur-yellow, when a large quantity of the test was used.§	Black, mottled with yellow.	Bright orange.	Deep olive-green.
Broth	Pale, but bright, sulphur-yellow.	Clotted, heavy, black, mottled with gray.	Dull orange, heavy.	Pale brown, partly suspended.
Milk	Bright golden-yellow.	Black, clotted.	Orange.	Brown, greenish when the mixture was shaken.
Tea	A beautiful yellow.	Brownish-black.	Reddish orange, flocculent.	Not tried.
Coffee ...	A deep golden-yellow.‖	Nearly black.	Deep brownish-orange.	Not tried.
Madeira Wine	Sulphur-yellow.	Dirty white, or slate color.	Beautiful bright orange.	Vide 1st Table.
Port Wine	Fawn color.	Slate color, with violet supernatant fluid.¶	Dark brown, with a tinge of orange.	Violet, heavy.
Gruel	Bright queen's yellow.	Black dense clots.**	Orange clotted.	Dusky yellowish-green.

* This precipitate, dried upon a filter, and heated with some caustic potassa in a slender test tube, is decomposed in a few seconds, forming a sulphuret of potassium, while the arsenic is volatilized in its metallic form, and adheres to the sides of the tube. (Orfila.)

† All substances containing tannic acid in solution greatly impair the solvent influence of fluids on arsenious acid.

‡ Dr. Pereira states, that, when the solution of the tartar emetic is very dilute, and the sulphureted hydrogen gas passed through it *only for a few seconds*, the precipitate is of a lemon yellow, closely resembling that produced by arsenious acid. (Med. Gaz., April, 1836.)

§ This sulphuret, added to a solution of the phosphates, throws down a greenish-yellow precipitate, the supernatant fluid being yellow and turbid.

‖ Lime water, also, added to coffee containing arsenious acid, throws down a yellow precipitate; although it precipitates the watery solution of arsenious acid white. (Orfila.)

¶ Corrosive sublimate cannot be exhibited in port wine with an intention to commit murder, (except by a self-murderer,) as it changes the color of the wine to pale violet.

** All the precipitates by the sulphuret, when dried, and heated in a tube with iron filings, afford metallic mercury, which forms globules on the sides of the tube.

III.—SOLUTION OF AMMONIACO-SULPHATE OF COPPER.

Solvents.	Precipitates from Solutions of Arsenious Acid.	Precipitates from Solutions of Corrosive Sublimate.	Precipitates from Solutions of Tartar Emetic.	Precipitates from Solutions of Chloride of Barium.
Water....	Beautiful grass-green. It completely disappeared on the addition of a few drops of strong acetic acid.*	White, thick, and heavy.	Pale whitish-blue, very little thrown down.	Copious whitish-blue.
Broth	Beautiful pale green, suspended.†	White, curdy, partly suspended, partly thrown down.	Pale whitish-blue, with a tint of green.	Opaque, glaucous.
Milk	Pale grayish-green.	Bluish-white, curdy.	Whitish-blue.	Curdy white, with a tinge of blue.
Tea	Obscure olive, but scarcely a precipitate.	Dirty yellowish white, curdy.	Muddy, pale bluish-green.	Grayish, heavy, supernatant fluid, yellowish-green.
Coffee....	Dark grass-green.‡	Dirty white.	Dirty bluish-green.	Not tried.
Madeira Wine	Grayish, with a slight tinge of green.	Heavy clotted white, with a tint of green.	Æruginous blue.	Vide 1st Table.
Port Wine	Clotted, heavy, dark greenish-gray.	Heavy, clotted, bluish-gray.	Heavy, dirty slate-blue.	Dirty violaceous-gray.
Gruel	Beautiful grass-green.	Pale bluish-white.	Pale bluish-green.	Pale bluish-green.

IV.—SOLUTION OF AMMONIACO-NITRATE OF SILVER.

Water....	Copious bright sulphur-yellow.§	Dull yellowish white, clotted, changing to dirty-white.	Pale brown.	White, heavy; soon blackening.
Broth	White, (owing to the chloride of sodium,) but yellow when treated with nitric acid.	White, copious.	Brownish, mixed with much muriate of silver.	White, dense, curdy.
Milk	White, with a tint of yellow.	Dirty-white.	Very pale, scarcely visible brown.	Not tried.
Tea......	Yellowish white, which soon blackens.	Dirty-white.	Dirty-brown.	Not tried.
Coffee....	Yellow, remaining unchanged.	White, changing to black.	Not tried.	Not tried.
Madeira Wine	Pale sulphur-yellow.	Dirty-white, changing to black.	White.	Vide 1st Table.
Port Wine	White, becoming brown on exposure to the light.	Idem.	Dirty-white.	Heavy, dirty-white.
Gruel	Yellowish.	Dense, dirty-white clots.	Not tried.	Dense, clotted-white.

Caution. The result of no *single* test should be depended on. Those most to be relied on are the *Reduction test*, *Rensch's test*, and with *proper precautions* those depending on the liberation of *arseniureted hydrogen;* also among the liquid tests, the *ammoniacal acetate and sulphate of copper* and *nitrate of silver.* Otto has lately shown that when a poisonous mass of white of egg and potatoes is boiled with a lye of potassa and afterwards acidulated with muriatic acid, no precipitate is produced by sulphureted hydrogen. This results from the action of potassa on proteine bodies forming a sulphuret of potassium, the sulphur of which being liberated by the acid, throws down the arsenic, which is then removed by filtration. Hence it would appear a bad plan to boil such substances with potassa, as recommended by Christison and Devergie.

ARSENIC, ANTIDOTES TO. The hydrated sesquioxide of iron, in the gelatinous state, appears to be the only substance yet discovered worthy of being considered as an antidote to arsenic. It should be given in doses of a tablespoonful every ten minutes. Lime-water and chalk and

* This test is capable of detecting arsenious acid in a solution containing $\frac{1}{110000}$ of its weight. (Orfila.)

† It has been suggested that onions, boiled in broth, or eaten so as to impregnate with their qualities the contents of the stomach, might produce the same effects on ammoniaco-sulphate of copper, as if arsenious acid were present; but although the fluid is tinged a green color, yet no precipitate forms.

‡ Dr. Porter, of South Carolina, says, that sulphate of copper with ammonia produces the same colored precipitate in coffee which contains no arsenious acid. (American Journal of Science, vol. iii. p. 354.)

§ A similar precipitate is formed by nitrate of silver, in a solution of any of the phosphates, and with chromate of potassa; but the fact of the precipitate being occasioned by arsenious acid is easily ascertained by testing a fresh portion of the solution with lime-water. If it contain arsenious acid, a copious white precipitate will be thrown down; if a phosphate only, there is scarcely any change, or at the most a translucent flocculent precipitate, which remains long suspended. A method of employing this test was suggested by Dr. Paris: namely, to put upon a piece of clean white paper a broad streak of the suspected fluid, and then run lightly over it a stick of lunar caustic; or the streak may be brushed lightly over with liquid ammonia, immediately after the application of the caustic; if arsenious acid be present, a bright queen's yellow is instantly produced, which remains permanent for nearly an hour; but when the lunar caustic produces a bright yellow before the ammonia is applied, we may suspect the presence of some phosphate.

water have also been recommended. Opium, camphor, and ether, may be employed as after remedies, to recruit the nervous system.

Remarks. The first endeavor, in cases of poisoning by arsenic, should be to remove, if possible, the poison from the stomach; for this purpose strong emetics or the stomach-pump should be had recourse to, after which the hydrated sesquioxide of iron may be administered.

ARSENITES. Salts formed of the previous acid (arsenious) and the bases. The alkaline arsenites may be prepared by saturating a solution of the acid, with another of the base, and most of the insoluble arsenites may be made by adding a soluble salt of the metal to a solution of the arsenite of potassa or ammonia.

ARSENIURETED HYDROGEN. A compound of arsenic and hydrogen, discovered by Scheele.

Prep. Melt metallic arsenic with an equal weight of grain zinc, reduce the alloy to coarse powder, place it in a gas bottle, and pour over it strong muriatic acid. (Soubeiran.) It must be collected in the pneumatic trough.

Prop. Inflammable, extinguishes combustion, and destroys life. At a red heat it deposites its arsenic in the metallic state.

ARTICHOKE. This esculent resembles asparagus in its general properties, but it is said to be more nutritious and diuretic. It is dressed in several ways according to the fancy of the cook. See Asafœtida, p. 83.

ASAFŒTIDA CLYSTER. *Prep.* Asafœtida ½ gramme; yelk of 1 egg; water ½ pint. *Proc.* Dissolve. *Use.* This quantity is sufficient for 10 or 12 clysters for children under 1 year; 5 or 6 for those under 3 years; and 2 or 3 for those under 7. Two clysters are prescribed daily in hooping-cough.

Remark. M. Reiken has found this more successful in removing hooping-cough than any other remedy. To ensure success, it should not be administered until the feverish symptoms have passed. M. Reiken sometimes uses an ointment of asafœtida, as well as the clyster.

ASARABACCA SNUFF. *Syn.* Cephalic Snuff. *Prep.* Asarabacca leaves and Lundyfoot snuff, of each 1 oz.; lavender flowers, 1 drachm; essence of bergamotte and oil of cloves, of each 2 drops. *Proc.* Grind the lavender with the snuff and leaves to a fine powder, then add the perfume.

Remarks. This is a great improvement on the old form with herbs. It is an excellent errhine, and is much recommended in headaches, dimness of sight, &c.

ASARINE. A substance resembling camphor, obtained from the root of the Asarum Europæum, (Asarabacca,) by distillation along with water.

ASBOLINE. A substance found by Braconnot in soot, and on which he thinks the anthelmintic virtue of the latter depends. Berzelius regards it as impure acid pyretine.

ASCARIDES. Small thread worms that produce a disagreeable irritation near the extremity of the anus. They are best removed by mild purgatives and the use of a clyster of aloes.

ASCARIDES, ELECTUARY FOR. *Ing* Flowers of sulphur, 4 oz.; powdered jalap, 1 oz. powdered bark, 1 oz.; sirup of buckthorn, q. s *Proc.* Make them into an electuary. *Dose.* Two or three teaspoonfuls every morning.

ASH-BALLS. The ashes of various plants, especially ferns, damped and made into balls. *Use.* As a substitute for soap in washing, and to clean painting.

ASPARAGIN. *Syn.* Asparamide. Althæine Agedoile. A substance found in the potato, marshmallow, liquorice, asparagus, and some other vegetables.

Prep. Boil the expressed juice of the asparagus, filter, and evaporate.

II. Macerate the bruised root of the marshmallow with milk of lime; filter, precipitate with carbonate of ammonia, and evaporate.

Prop. In its purest state it forms large prismatic crystals, soluble in water and proof spirit. Alkalis and acids, with the aid of heat, convert it into aspartic acid.

ASPARAGUS. *Qual., &c.* A very nutritious article of food, possessing slightly diuretic properties, and little disposition to induce flatulence. Asparagus is cooked by boiling, which is done as quickly as possible, without breaking the heads, and is served with melted butter. The head, or upper part, is that which is eaten. Sometimes the lower or white end is removed before boiling. Many nice little side-dishes are made with asparagus; among which the following may be classed:—Cut off the top of a French roll and take away all the crumb, then fry it brown in butter, and fill it with a hot mixture of cream and yelk of egg, previously stirred together over the fire until thickened, and then beat up with the boiled tops of asparagus, and a little salt and nutmeg. Place on the top of the roll that was cut off, and over all stick in a few of the greenest heads of asparagus. This is called "asparagus forced."

ASPARAGUS, CULTIVATION OF. Choose that situation which is the longest exposed to the sun during the heat of the day. Dig a pit 5 feet deep, and sift the mould through a searce, having about 6 holes to the inch; then fill up the bed with the following layers: 1,—6 inches of good dung; 2,—6 inches of turf; 3,—6 inches of dung; 4,—6 inches of sifted earth. Repeat the layers in the same order a second time. Then fill up the last foot with a mixture of equal parts of sifted earth and dung. Now divide the ground into beds, 5 feet wide, by paths made of turf, laid down 18 inches wide and 9 inches deep. The plants must be set in March, 15 inches asunder, placing the bud or top of the root about 1½ inches beneath the surface, and spreading the roots out as much as possible. Mark the place where each plant is set, by placing a small piece of stick in the spot. As soon as the bed begins to sink, a few spadefuls of fine sand may be thrown over it, especially on the spots where the plants are set. Should some of the plants die, their places may be supplied by others, set later in the season. The plants should be 2 years old when transplanted, and in 3 years may be cut for the table.

Remarks. A bed of this kind will last 30 years or longer. The young plants are raised from seed, set two together, about 1 inch deep and 9 inches apart, in beds of good earth, removing the weakest of the two plants in the ensuing spring. A little good dung may be scattered over the beds in

autumn. The male plants alone should be selected for transplanting. During winter, asparagus may be raised by the use of tan in hotbeds.

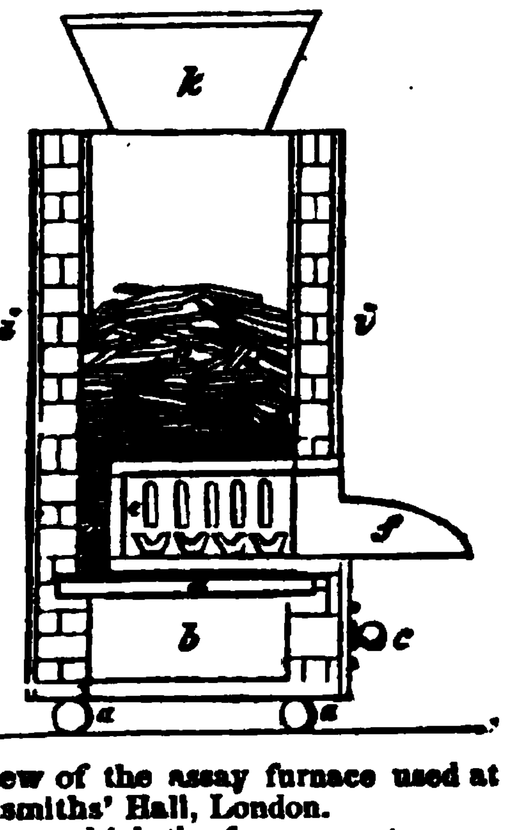
ASPHALTUM, PREPARED. *Syn.* Liquid Asphaltum. *Prep.* I. Melt Scio turpentine 2 oz.; then add powdered asphaltum 1 oz. When mixed, remove the vessel from the fire, cool a little, and add oil of turpentine until it be reduced to a proper consistence.

II. (Wilson's.) Melt 1 oz. of asphaltum; then add 2 oz. of balsam of copaiba. Remove it from the fire, and thin with turpentine.

Remarks. The turpentine must be heated before adding it to the other ingredients, as if cold, they will set before it can be mixed in. *Use.* As a black japan or varnish. An excellent glazing color.

ASPHALTUM, FACTITIOUS. A substance under this name, and which is also often sold for genuine asphaltum, is made from the bottoms of Barbadoes tar, by heating them until quite hard. Color and hardness inferior to asphaltum.

ASSAY, (ASSAYING.) *Syn.* Coupellation, (*Fr.*) Atreiben auf der Capelle, (*Ger.*) The method of determining the quantity of pure gold and silver in the alloys of these metals. This art requires great skill and experience in its performance; and from the costliness of the precious metals, and their general employment in the manufacture of coin, plate, jewellery, &c., is of the utmost importance. At the Royal Mint of England there are two assay-masters—the master's assayer and the king's assayer. The business of the former is to receive and examine the gold and silver ingots brought for coinage, and of the latter to examine the melted bars previously to their being coined into money. When the money is coined, it is "*pixed*" before being sent from the Mint. This consists in making an assay of one piece out of each "*journeyweight*" of coin, to ascertain if it be of the proper standard. The king's assayer thus becomes responsible for the purity of all the gold and silver coin issued from the Mint. The following is a brief notice of the art of assaying.



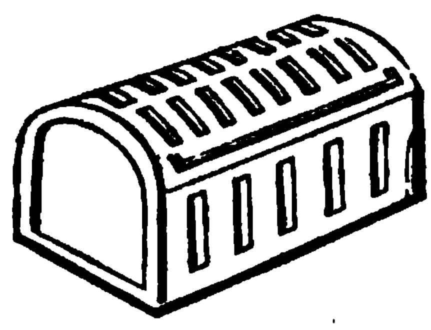
Sectional view of the assay furnace used at the Royal Mint and Goldsmiths' Hall, London.
a a, Rollers on which the furnace rests.
b, Ash-pit. c, One of the ash-pit dampers.
d, Grate supporting the muffle-plate.
e, Muffle containing the cupels.
f, The mouth-plate for the ignited charcoal.
h, Interior of furnace containing charcoal.
i i, Walls of the furnace.
k, Moveable chimney for regulating draught.

Operation of Assaying. *Materials, apparatus, &c.—The furnace.* Before an assay can be made, it is necessary to be provided with a suitable furnace, muffle, and cupel. The *furnace* used for assaying at the Royal Mint and Goldsmiths' Hall, London, has the following proportions, and is represented above.

Dimensions. Total height 2½ feet; from the bottom to the grate, 6 inches; the grate, muffle-plate, and bed of loam that covers it, 3 inches; the space between the grate and the bottom of the funnel or chimney, 21½ inches; funnel, 6 inches. A furnace of any other shape and size may be employed, provided it will afford a sufficient heat, and allow the introduction of the muffle.

The muffle is a pot of the shape of fig. 1, made of clay, and furnished with an opening to admit the introduction of the cupels, and inspection of the process. It is placed on the muffle-plate, (see preceding figure,) by which it is introduced into the furnace.

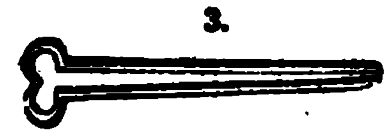
1.



The cupel is a sort of shallow crucible, made of bone ashes or burnt bones. At the Royal Mint the cupels are made of the calcined cores of ox-horns. The powder is slightly moistened with water, and a circular steel mould is filled therewith, and after being pressed down tight, is finished off with a rammer, having a convex face of polished steel, which is struck forcibly with a mallet, until the mass becomes sufficiently hard and adherent. The cupel is then carefully removed, and exposed in the air to dry, which usually takes from 14 to 21 days. Fig. 2 represents a cupel in section, and fig. 3 the tongs for charging the same. The best weight for cupels is said to be 180 to 200 grs.

2.

3.



Process of assaying. The muffle, with the cupels properly arranged, being placed in the furnace, the latter is filled up with charcoal, and lighted at the top by placing a few pieces, heated to whiteness, on last. When the cupels have been exposed for half an hour, and have become white by heat, the lead is put into them by means of the tongs, and as soon as this becomes thoroughly red and circulating, as it is called, the metal to be assayed, wrapped in a small piece of paper, is added, and the fire kept up strongly until the metal enters the lead and circulates well, when the heat may be slightly diminished, and so regulated that the assay shall appear convex and ardent, while the cupel is less red—that the undulations shall circulate in all directions, and that the middle of the metal shall appear smooth, surrounded with a small circle of litharge, which is being continually absorbed by the cupel. This treatment must be continued until the metal be-

comes bright and shining, or is said to "*lighten;*" after which certain prismatic colors, or rainbow hues, suddenly flash across the globules, and undulate and cross each other, and the latter metal soon after appears very brilliant and clear, and at length becomes fixed and solid. This is called the "*brightening*," and shows that the separation is ended. In conducting this process, all the materials used must be accurately weighed, especially the weight of the alloy before cupellation, and the resulting button of pure metal. The difference gives the quantity of alloy. The preceding general description of the process of cupellation will render the following articles intelligible, without again entering into the minutiæ of the operation.

Assayers' weights. The richness or purity of gold is expressed in carats. Pure gold is spoken of as containing 24 carats, of 12 grains each; and any other sample, containing 12, 18, 22, or any other number of parts of pure gold, in 24 parts, is said to be of so many carats fine. In the process of assaying gold, the real quantity taken is very small, generally 6 or 12 grains; and this is termed the "*assay pound.*" It is nominally subdivided into 24 carats, and each carat into 4 assay grains, and each grain into quarters, so that there are 384 separate reports for gold. When the assay pound is only 6 grs., the quarter of the assay grain will only weigh the $\frac{1}{64}$ of a grain; hence the most accurate system of weighing must be adopted.

The richness or purity of silver is either expressed in pennyweights or 1000ths. In the first case, it is supposed that the mass of silver to be examined consists of 12 equal parts, called pennyweights; so that if an ingot weighs an ounce, each of the parts will be 1-12th of an ounce. Hence, if the mass of silver be pure, it is called silver of 12 pennyweights; if it contain 1-12th of its weight of alloy, it is called silver of 11 pennyweights; if 2-12ths of its weight be alloy, it is called silver of 10 pennyweights; and so on in proportion for other qualities. It must be observed here, that the assayers give the name pennyweight to a weight equal to 24 real grains, which must not be confounded with their ideal weights. The assayers' grains are called fine grains. An ingot of fine silver, or silver of 12 pennyweights, contains, then, 288 fine grains; if this ingot contain 1-288th of alloy, it is said to be silver of 11 pennyweights and 23 grains; if it contain 4-288ths of alloy, it is said to be 11 pennyweights, 20 grains, &c. Now a certain real weight must be taken to represent the assay-weights: for instance, 36 real grains to represent 12 fine pennyweights; this, if subdivided into a sufficient number of other smaller weights, will also represent fractions of fine pennyweights and grains. Thus, 18 real grains represent 6 fine pennyweights; 3 real grains represent 1 fine pennyweight, or 24 grains; a real grain and a half represents 12 fine grains; 1-32d of a real grain represents a quarter of a fine grain, which is only 1-752d part of a mass of 12 pennyweights. The purity of silver is now more frequently expressed in 1000ths, which admits of greater accuracy.

Remarks. An assay is thought to be good when the bead is of a round form, with its upper surface brilliant, its lower one granular and dead-white, and when it separates readily from the cupel. When the surface of the bead is dull and flat, it shows that too much heat has been employed; and if the metal be silver, some may have been lost in the process, by fuming or absorption. When the bead is spongy, and of various colors, and scales of litharge still remain on the cupel, and the metal adheres strongly to the latter, too little heat has been used, and the button still retains some lead. To remedy this, the heat should be raised, and a little powdered charcoal, or a few small pieces of paper, thrown into the cupel, until the metal again begins to circulate freely. It is necessary that the lead employed in the process of cupellation should be perfectly pure. It ought, therefore, to be procured by reducing refined litharge.

ASSAY OF SILVER. I. The assay pound (usually 12 or 20 grains for silver) of the alloy for examination is accurately weighed, and then wrapped in a small piece of paper ready to undergo the process of cupellation. The quantity of lead used is not uniform; but depends on the nature of the alloy. It should be 16 times the weight of the copper presumed to be present in the sample. This, however, cannot be accurately ascertained, though an experienced assayer is generally able to guess very nearly the amount. If too much lead be used, the button obtained by cupellation will be too small, owing to some of the silver being absorbed by the cupel; and if too little be used, the button will come out too large, from still containing some copper. The importance of justly proportioning the lead to the quantity of copper present in the alloy, cannot be too much insisted on. The following table exhibits the proper quantities adapted to silver of various degrees of fineness.

Assay Table, by M. D'Arcet.

Fineness of the Silver.	Proportion of Copper in the Alloy.	Dose of Lead required, the weight of silver being one.	Relation between the Lead and Copper.
Silver at 1000	...	$\frac{3}{10}$	
950	50	3	70 to 1
900	100	7	60 to 1
800	200	10	50 to 1
700	300	12	40 to 1
600	400	14	35 to 1
500	500	16 to 17	32 to 1
400	600	do.	26·6 to 1
300	700	do.	22·8 to 1
200	800	do.	20 to 1
100	900	do.	17·7 to 1
pure copper.	1000	do.	16 to 1

Remarks. As the lead always carries off a small portion of the silver into the cupel, the assay generally comes out too low, which was ascertained by M. D'Arcet to be equal to—

For fine silver, ... $\frac{1}{1000}$

" $\frac{900}{1000}$ " . . . . . $\frac{4·3}{1000}$

" $\frac{800}{1000}$ " . . . . . $\frac{4·9}{1000}$

For $\frac{500}{1000}$	"	$\frac{4{\cdot}2}{1000}$
" $\frac{100}{1000}$	"	$\frac{0{\cdot}4}{1000}$

During the process of cupellation with silver, the button is apt to "*vegetate*," especially if it be fine silver, and therefore requires to be carefully watched; for which purpose the cupel is usually kept at a convenient part of the muffle, ready to be drawn forward if required. It has just been seen that to apportion the lead correctly requires that the title of the silver should be known; when this is not the case, it may be determined approximatively, by exposing in the cupel 0·1 part of the sample with 1 part of lead. French gold and silver coin contain $\frac{1}{10}$ of copper; British silver coin consists of $\frac{12}{13}$ of silver, and $\frac{1}{13}$ of copper; and British gold coin of 11 parts of gold and 1 of copper, or a mixture of copper and silver.

II. *Humid assay of silver.* *a.* Dissolve 10 grs. of the alloy in 100 grs. of nitric acid, sp. gr. 1·28, by the aid of heat; the solution being made in a tall stoppered glass tube, furnished with a foot; then place it in a very delicate balance, which must be brought into an exact state of equilibrium, and add the test solution gradually and cautiously until the whole of the silver be thrown down; but the utmost care must be taken not to exceed this point. The number of grains now required to restore the equilibrium of the scales gives the exact quantity of pure silver present in 1000 parts of the sample.

Test liquor. Dissolve 54·27 (54¼) grs. of pure sea salt in 9945·73 grs. (or 22 oz. and 320¾ grs. avoirdupois) of distilled water; filter, and keep the liquor in a stoppered bottle for use.

Pure sea salt. Boil together for a few minutes, in a glass vessel, a solution of salt with a little pure bicarbonate of soda; filter; add muriatic acid until the liquor be neutral to litmus and turmeric paper; then evaporate and crystallize.

Remarks. The addition of the test liquor to the solution requires the *utmost exactness.* After each addition the stopper should be placed in the tube, and the latter violently agitated for a short time, when the liquor will rapidly clear and enable us to see when the operation is concluded. We must then, as a check, add a small quantity of a solution of nitrate of silver to the liquor in the tube, after having first carefully taken the weight. If too much of the test liquor has been added, this will produce a fresh precipitate, and the assay cannot then be depended on.

Instead of weighing the quantity of test liquor used, a tube graduated into 100 parts, and holding 1000 grs., may be used instead, every division of which required to throw down the silver, will represent the $\frac{1}{10}$th of a grain. The tube being filled to the 0, is ready for use, and from being graduated downward the quantity poured out may at once be read off. Generally speaking, however, measuring does not admit of the same accuracy as weighing. The termination of the operation is clearly marked, when, on adding a minute quantity of the test liquor to the silver solution, no cloudiness occurs. (See Alkalimetry and Acidimetry.)

b. The precipitate thrown down in the last experiment may be collected in a filter of white paper, and dried, washed, and weighed. The previous weight of the paper, deducted from the gross weight of the paper and silver, will give the quantity of chloride of silver present, which multiplied by ·7533, the weight of metal in one grain of the chloride, will give the exact weight of the pure silver contained in the sample.

Remarks. Mercury is the only metal whose presence at all interferes with the process; the chloride of mercury being also thrown down by salt, as well as the chloride of silver. When no mercury is present in the precipitate, it rapidly becomes black on exposure to the light, but when it contains $\frac{4}{1000}$ or $\frac{5}{1000}$ of chloride of mercury, it remains of a dead white, with $\frac{3}{1000}$ it is not sensibly discolored by the diffused light of a room, with $\frac{2}{1000}$ only slightly darkened, with $\frac{1}{1000}$ more so, but with pure chloride of silver, the effect is very rapid and intense. When mercury is present, which is however seldom the case, the assay sample must be placed in a small crucible, and exposed to a full red heat, before solution in the acid. For the method of assaying silver by the humid way, when alloyed with gold, see Gold. Those who wish to enter fully into the subject of the humid assay of silver, are referred to Gay Lussac's Essay.

ASSAY OF GOLD. 1. This process may be divided into five operations.

I. *Cupellation.* Either 6 or 12 grs. of the alloy is the weight usually taken for the assay, to which is added 16 parts of lead for every 1 part of copper that it is presumed to contain, though considerably more lead may be used when the sample does not contain any silver; but if the reverse be the case, an excess of lead would lead to the loss of the latter metal, which ought not to be separated until the operation of parting. When silver is present an additional allowance of lead, equal to $\frac{1}{10}$ of its weight, is made on that account. When, however, the quantity of silver is small, or is not required to be estimated, it becomes of little consequence what weight of lead is employed, so long as enough be used to carry off the base metals, at the same time that the quantity is not too large for the cupel. The sample is then submitted to cupellation. This process does not require so much care for gold as silver, as none of this metal is absorbed by the cupel, or lost by evaporation, and it will safely bear the highest heat of the furnace without injury. In other respects the operation may be conducted in exactly the same manner as for silver.

II. *Quartation.* After gold has passed the cupel, it may still retain either of the other perfect metals, particularly silver. To remove the latter it undergoes the operations of quartation and parting. *Quartation* is performed by adding 3 parts of silver to one of the cupelled sample, and fusing them together, by which the gold is reduced to one fourth of the mass or even less; hence the name. In this state nitric acid will dissolve out the silver, which brings us to the next operation.

In many cases the operation of quartation is performed conjointly with that of cupellation, as in the processes of Nos. 2 and 3.

III. *Parting.* The alloy of gold and silver thus formed, is next hammered or rolled out, into a thin strip or leaf, curled up into a spiral form, and submitted to the action of nitric acid, sp. g. 1·3, diluted with half its weight of water; this being poured off, another quantity of acid, of about 1·26, and undiluted, may be employed. In each case the acid should be boiled upon the alloy for about a quarter of an hour. In the first case the quantity of fluid should be about 2½ oz., and in the second 1½ oz. The second part of the operation of parting is called the "*reprise.*" If the acid be used too strong it leaves the gold in a state of powder, otherwise the metal preserves its form throughout the process of parting. It is next carefully collected, washed, and dried.

IV. *Annealing.* The sample of pure gold has now only to be annealed, which is done by putting it into a small porous crucible, and heating it to redness in the muffle.

V. *Weighing.* The pure gold is next accurately weighed. This weight doubled or quadrupled, gives the number of carats fine of the alloy examined, without calculation.

Remarks. The loss of weight by cupellation gives the amount of copper in the sample; that after parting, the amount of silver, deducting of course the weight of silver used in the process, which is called the "*witness.*" When the sample contains but very little gold, the dry method of assaying cannot be depended on, and chemical analysis must be had recourse to.

2. (*M. Chaudet's process.*) Submit to cupellation 0·500 of the sample with 1·500 of pure silver, and 1·000 of pure lead. Form the button into a strip or riband 3 inches long, and roll it into a cornet. Boil for 3 or 4 minutes in a matrass with nitric acid of 22° Baume, decant and again boil for 10 minutes with acid of 32° Baume, again decant and repeat the last boiling with a fresh lot of acid, at 32 B. for 10 minutes longer. Next wash the cornet with pure water, put it into a small crucible permeable to water, and submit it to a dull red heat in the muffle. Lastly, cool, take it from the crucible, and weigh it.

Remarks. The above is M. Chaudet's method of assaying fine gold. It affords very perfect results.

3. (*Old French government method.*) *Oper.* "Twelve grains of the gold intended to be assayed must be mixed with 30 grs. of fine silver, and cupelled with 108 grs. of lead. The cupellation must be carefully attended to, and all the imperfect buttons rejected. When the cupellation is ended, the button must be reduced by lamination into a plate of 1½ inch, or rather more, in length, and 4 or 5 lines in breadth. This must be rolled up upon a quill, and placed in a matrass capable of holding about 3 oz. of liquid, when filled up to its narrow part. Two oz. and a half of very pure aquafortis, of the strength of 20° of Baume's areometer, must then be poured upon it; and the matrass being placed upon hot ashes, or sand, the acid must be kept gently boiling for a quarter of an hour: the acid must then be cautiously decanted, and an additional quantity of 1½ oz. must be poured on the metal, and slightly boiled for 12 minutes. This being likewise carefully decanted, the small spiral piece of metal must be washed with filtered river water, or distilled water, by filling the matrass with this fluid. The vessel is then to be reversed, by applying the extremity of its neck against the bottom of a crucible of fine earth, the internal surface of which is very smooth. The annealing must then be made, after having separated the portion of water which had fallen into the crucible: and, lastly, the annealed gold must be weighed. For the certainty of this operation, two assays must be made in the same manner, together with a third assay upon gold of 24 carats, or upon gold the fineness of which is perfectly and generally known."

"No conclusion must be drawn from this assay, unless the latter gold should prove to be of the fineness of 24 carats exactly, or of its known degree of fineness; for, if there be either loss or surplus, it may be inferred that the other two assays, having undergone the same operation, must be subject to the same error."

4. (*When the alloy contains platina.*) This alloy generally contains copper, silver, platina, and gold. The sample must be cupelled in the usual way, and the loss of weight will express the amount of copper; the button, made into a riband and treated with sulphuric acid, will indicate, by the portion dissolved, the amount of silver present. By submitting the residuum to quartation, the platina will become soluble in nitric acid. The loss after digestion in this menstruum will express the weight of that metal, and the weight of the portion now remaining will be that of the pure gold.

5. *Other methods. Assay of the touch. Jewellery, small quantities, &c.* When it is desired to ascertain the fineness of small quantities of gold, as in jewellery, &c., touch needles and stones are employed. The former are made in sets, containing gold of different finenesses and differently alloyed with copper and silver. Pieces of black pottery form excellent touch stones. The mode of using them is to mark the stone with the sample under examination, and to compare its appearance, hardness, &c. with that produced by one or more of the needles. When the two are similar, the quality is considered to be the same. They are then further examined by moistening the stroke with aquafortis when red hot.

General Remarks. The preceding is a brief notice of the most approved methods of assaying. Other ways of determining the constitution of alloys exist, which are not only easier to perform, but far more accurate. In the dry way, the causes of error are numerous, and assays made by different persons after that plan, seldom agree closer than one or two thousandths, while in the case of silver, it often amounts to $\frac{5}{1000}$ or $\frac{6}{1000}$. Thus samples of the same silver sent by the French government to be assayed at different places, gave different results.

At the Mint of Paris		895·6
"	Vienna	898·4
"	Madrid	893·7
"	Naples	891·0

the difference between the two extremes of which is $\frac{7\cdot4}{1000}$, whereas, each of these samples really contained $\frac{900}{1000}$ of pure silver. It will be thus seen, as before explained, that the assay of silver always comes out *too low*, besides being more ex-

posed to error in the operation than gold. Chemical analysis, or the humid process of assay, admits, however, of ascertaining with certainty the quantity of each metal in an alloy to a degree of exactness unattainable by the cupel.

ASSES' MILK, SUBSTITUTE FOR. *Prep.* I. Boil together one quart of new milk, one ounce each of sugar-candy and ground rice, and one drachm of eringo root bruised. Strain.

II. Mix together one ounce of lump sugar, the white of two eggs, and half a pint of the best milk, then add half a teaspoonful of sirup of tolu, and mix well.

III. Boil together a pint of water and 1 oz. of hartshorn shavings, until reduced to a jelly, then add 2 oz. of lump sugar; dissolve; when cold add 1 pint of new milk, and a teaspoonful or less of sirup of tolu.

Remarks. The above are among the best forms for this article. Others are often adopted of a very dirty class, as boiling snails, &c. with water, and so many medicaments, that I presume any thing but an article resembling asses' milk is produced. *Use.* As a beverage, a cupful with or without a spoonful of rum, three or four times a day, or ad libitum. *An old woman's remedy for consumption.*

ASTHMA. (From ἀσθμαίνω, I breathe hard.) A disease characterized by difficulty of breathing, coming on by fits, accompanied by a wheezing sound, cough, and tightness of the chest, and generally terminating in a copious expectoration, after the lapse of a few hours. Asthma is principally confined to the later periods of life, and appears in many cases to be hereditary. The fits vary from two to several hours' duration. Sometimes copious expectoration attends asthma, which has led to its division into two kinds,—dry (asthma siccum) and humid, (asthma humidum.) It is brought on by sudden exposure from heat to cold, to unwholesome effluvia, by hard drinking, full meals, violent exercise, and by cold, damp, and foggy weather.

Treatment. I. *Prev.* Avoid the above exciting causes. Seek a dry, warm, and airy situation. Wear flannel, keep the bowels regular, and the stomach in order. *Cure.* The severity of the paroxysm may be lessened by adopting the sitting posture, and inhaling the vapor of hot water, or an infusion of chamomile. Emetics and diaphoretics, followed by mild purgatives, may also be administered with advantage. Various other remedies have also been recommended; among the principal are tobacco and stramonium smoking. In using the latter herb, the root and lower parts of the stem are chopped up and placed in the bowl of a common tobacco-pipe, and a few whiffs are occasionally taken. Drinking at the same time should be avoided. Lately the lobelia inflata, or Indian tobacco, has been highly extolled in asthma. The dose of the tincture is from 20 drops to ʒij. A light nutritious diet and strictly regular habits should be adopted, which will often produce a marked improvement and effect a cure, when medicines have failed. The use of bark or bitters will tend to improve the general tone of the system.

ASTHMA, DRAUGHT FOR. *Prep.* Vinegar of squills, ʒss; ipecacuanha wine, 15 drops; cinnamon water, 1½ oz.; mix for a draught to be taken three times daily. Expectorant.

ASTHMA, MIXTURE FOR. *Prep.* I. (*Expectorant.*) Milk of gum ammoniacum 3 oz., sirup of squills 2 oz., wine of ipecacuanha 1 oz.; mix. *Dose.* A small teaspoonful 4 or 5 times daily.

II. (*Tonic.*) Infusion of cascarilla 3 oz., infusion of gentian 2 oz., simple sirup 1 oz.; mix. *Dose.* Two tablespoonfuls 3 times a day.

ASTHMA, PILLS FOR. I. (*Expectorant.*) Compound squill pill 20 grs., calomel 5 grs., powdered opium 3 grs.; make them into 6 pills. *Dose.* One or two at bedtime. Expectorant, and sometimes laxative.

II. (*Tonic.*) Compound iron pills, 2 drachms, extract of gentian, 1 drachm; mix, and divide into 60 pills. *Dose.* Two night and morning.

ASTRINGENTS, (In Medicine.) Substances that constrict the animal fibre, and coagulate albumen. When employed to check bleeding, they are called styptics. The principal *vegetable astringents* are *catechu, kino, galls,* and *oak bark;* the principal *mineral astringents* are *sulphate of iron, nitrate of silver, chloride of zinc, sulphate of copper, acetate of lead,* &c.

ASTRINGENT COLLYRIUM. *Prep.* Compound liquor of alum, ½ oz., rose water, 5½ oz., laudanum, 60 drops. *Use.* For weak eyes.

ASTRINGENT PILLS. *Prep.* Alum, 6 grs., extract of opium, 1 gr., powdered catechu, 20 grs.; divide into 6 pills. *Dose.* One after each motion in diarrhœa.

ASTRINGENT POWDER. Powdered galls and burnt alum, of each equal parts, in very fine powder; mix. *Use.* For piles and soft polypi of the nose.

ATMOSPHERE, PURITY OF. *Test.* A simple method of ascertaining the presence of impurity (carbonic acid) in the atmosphere, is to nearly fill a glass tumbler with limewater, and to place it in any convenient position, as on the mantel-piece of a room. The rapidity with which a pellicle forms on its surface, or the water becomes cloudy, corresponds to the amount of the carbonic acid present in the atmosphere that surrounds it. II. A little moist carbonate of lead put on a plate or saucer, and exposed in the same way, will turn black, should any sulphureted hydrogen be contained in the air. This is a very delicate test for that destructive gas.

ATROPIA. *Syn.* Atropina. Atropine. Atropium. An alkaloid, or vegetable alkali, discovered in the atropa belladonna, by Brande. *Prep.* I. Make an aqueous decoction with 2 lbs. of the dried leaves of the deadly nightshade, press out the liquor, and boil them a second time; mix the two waters, and add a little sulphuric acid; then filter, supersaturate the liquor with potash, collect the precipitate, wash with cold water, and dry it. The product is 89 grs. This must then be purified by repeated solutions in dilute acid, the use of animal charcoal, and precipitation by an alkali. According to Mein and Thompson, 1 oz. of the root of belladonna yields 1 gr. of pure atropia.

II. Add freshly precipitated hydrate of magnesia to the filtered expressed juice of belladonna, evaporate to dryness as quickly as possible in a water bath, then pulverize the residuum, and digest it in strong alcohol; decant the clear liquid,

and allow it to evaporate spontaneously. The crystals may be purified by repeated resolutions in alcohol.

Remarks. This alkaloid is a powerful narcotic poison. In quantity scarcely appreciable, it occasions dilatation of the pupil, when applied to the eye. The $\frac{1}{10}$ of a grain causes very serious effects in the human subject. It is volatile at common temperatures, and rises in vapor at 212°; hence the danger of experimenting on this substance. Brande suffered so much from this cause, that he was compelled to discontinue his experiments on the properties of this alkali. It forms salts with many of the acids, which may be crystallized. They may be made by saturating the dilute acids with the bases.

ATROPIC ACID. Richter has given this name to a volatile and crystallizable acid, resembling the benzoic, extracted from the atropa belladonna, or deadly nightshade. (Pharm. Centr. Blatt. 1837, s. 614.)

ATROPHY. *Syn.* ATROPHIA. A wasting of the whole body. *Cause and Treatment.* This is generally produced by the body receiving an insufficient supply of nourishment, arising from imperfect digestion, diarrhœa, and in children, very frequently from worms. The best treatment is to keep the bowels regular, and to administer mild tonics, or alteratives, accompanied with a nutritious diet; cleanliness, fresh air, and moderate exercise are also essential. When worms are the cause, attempts should be immediately made to remove them. (See ANTHELMINTICS.)

AURANTIIN. The bitter principle extracted from the peel of the orange and lemon.

Prep. The exterior peel separated from the white matter, should be well dried by free exposure to warm dry air, until it has nearly lost its fragrance. It is then to be boiled with water, and the liquor strained off and evaporated to dryness. Purify by frequent solution in alcohol.

Prop. Possesses the bitter properties of the peel in a concentrated state, without any of its fragrance.

AURO-CHLORIDES. *Prep.* These salts may be prepared by mixing the terchloride of gold with the chloride of the base, in atomic proportions, and setting aside the solution to crystallize.

Prop. Most of the auro-chlorides crystallize in prisms, dissolve in both alcohol and water, have an orange or yellow color, and are decomposed at a red heat.

AURO-CHLORIDE OF HYDROGEN. Formed by cautiously evaporating an acid solution of terchloride of gold.

AVIARY, (from *avis*, a bird.) A place for keeping birds. *Situation, &c.* In constructing an aviary for exotic birds, a place should be selected where the temperature can be kept at a proper degree throughout the year, and which is well protected from the weather. This is most conveniently done by choosing a space attached to the summer or hot house. When the aviary is only intended for birds of climates similar to our own, any part of the open garden may be chosen, and a portion closed in. Among the commoner exotic birds kept in aviaries, are canaries, turtle-doves, parrots, and paroquettes; and among those inhabiting climates resembling Great Britain, are gold and silver pheasants, and the finer varieties of pigeons. Among aquatic birds may be mentioned black and white swans, Muscovy ducks, &c., all of which, however, require good protection from the vicissitudes of the weather.

AZOBENZIDE. *Prep.* Add solid hydrate of potassa to nitro-benzide, dissolved in alcohol in a retort; apply heat and distil the red solution. The first portion which comes over is alcohol, and the next azobenzide, which must be collected separately.

Remarks. Form. Large red crystals. Discovered by Mitzcherlitz.

AZOBENZULE. *Prep.* The residuum of the preparation of benzhydramide boiled with 100 parts of alcohol, deposites crystals of azobenzule on cooling. Form, a white crystalline powder.

AZOERYTHRINE. A substance extracted by Kane from Orchil. It is insoluble in alcohol, ether, and water; but very soluble in alkaline lyes, to which it imparts a port-wine color. (Phil. Trans. 1840, p. 273.)

AZOLITMINE. A substance extracted by Kane from litmus. It is insoluble in water and alcohol; soluble in alkaline lyes. It forms the principal ingredient in litmus.

AZOMARIC ACID. An acid discovered by Laurent during his researches on the turpentine of the pinus maritima. It is formed by submitting pimaric acid to the action of nitric acid.

AZURE, EGYPTIAN. *Prep.* Carbonate of soda 1 lb.; calcined flints 1½ lb.; copper filings ¼ lb.; all in fine powder. *Proc.* Mix and fuse them together in a crucible for 2 hours. When cold, reduce to an impalpable powder.

Remarks. This is a most beautiful and permanent sky-blue color. It is used in painting, and as a substitute for smalts.

AZURE, PIGMENT. *Prep.* Quicksilver 2 oz.; sulphur and sal ammoniac, of each ½ oz. *Proc.* Grind well together, and place the ingredients in a matrass, which must be exposed to a slow fire until an azure fume arises; then cool and powder. (Mackenzie.) *Remarks.* This form is stated to produce a color nearly equal to ultramarine, but I much doubt it.

BACHER'S PILLS. *Prep.* Extract of black hellebore and powdered myrrh, of each 1 oz.; carduus benedictus (blessed thistle) 3 oz.; mix and divide into 1-grain pills. *Dose.* 2 to 6 three times a day. Tonic.

BACON. *Qual.* When this article has been properly prepared from healthy meat, and is neither old nor rusty, it forms a very wholesome and excellent food, especially when eaten with vegetables. It is too strong, however, for the stomachs of very delicate persons, and should therefore be avoided by them. *Choice.* Good bacon has a thin rind, the fat has a firm consistence and reddish tinge; the lean has a pleasing red color, is tender, and adheres strongly to the bone. The streaky parts are the most esteemed as well as the most wholesome. When the fat has a yellowish tint, it is rusty, or becoming so, and should be avoided.

BAILEY'S ITCH OINTMENT. This consists of nitre, alum, sulphate of zinc, cinnabar, olive oil, and lard, scented with the essential oils

of aniseed, origanum, and lavender, and colored with alkanet.

BAKER'S ITCH. *Syn.* PSORIASIS DIFFUSA. This disease is of common occurrence on the hands of bakers; hence the vulgar name. *Treat.* Frequent ablution in warm water, keeping the bowels open with saline purgatives, and the nightly use of the following ointment will generally effect a cure. Salt food should be avoided as much as possible, as well as keeping the hands covered with dough and flour; the latter being the cause of the disease.

BAKER'S ITCH, OINTMENT FOR. Mix well together ½ oz. of ointment of nitrate of mercury, and 1 oz. of palm oil.

BAKING. (IN COOKERY.) One of the cheapest and most convenient ways of dressing dinners for small families. Though the flavor of baked meat is generally considered barely equal to the same roasted, yet there are some joints and dishes to which it appears particularly suitable. Among these may be mentioned legs and loins of pork, legs and shoulders of mutton, fillets of veal, &c. A baked pig, if it has been occasionally basted with melted butter during the operation, and the heat has not been too great, will eat equal to a roasted one. Geese and ducks treated in the same way are also excellent. A hare prepared in the same way as for roasting, and basted occasionally with milk and melted butter, will also eat well; so will various pieces of beef, especially the buttock. The latter should be prepared as follows:—After it has been salted about a week, it should be washed and put into a brown earthen pan, glazed inside, with about a pint of water; it should then be tied over with writing-paper, three or four times thick, and baked for 4 or 5 hours in a lightly-heated oven. A baked ham is preferable to a boiled one; it not only eats much tenderer, but cuts fuller of gravy, and has a finer flavor. Before being baked it should be soaked in clean water for an hour, then wiped dry with a towel, and covered with a thin paste or batter.

Much of the prejudice that exists against baking arises from the careless manner in which it is usually performed by the bakers, and also from so many different dishes, possessing such various flavors and odors, being baked together in the same oven.

BALDNESS. *Cause.* This is generally produced by fever or old age, but is sometimes found in comparatively young persons, enjoying perfect health. *Remarks.* When the hair bulbs have disappeared, there is no means known that will restore the hair, notwithstanding the daily assurances to the contrary, by numerous advertising impostors. When a disposition to baldness exists, or when the hair falls off in large quantities, the constant use of the hair-brush, and any emollient oil or pomatum, scented with some stimulating aromatic, will generally prove sufficient. Should this not succeed, the head should be shaved. The following formulæ tend to strengthen the hair, and to keep the head clean.

BALDNESS, OIL FOR. *Prep.* Salad oil 1 oz.; oil of origanum 12 drops; oil of rosemary 10 drops; oil of lavender 6 drops; oil of cloves 2 drops; mix and shake well together.

BALDNESS, POMMADE FOR. *Prep.* Beef suet 1 oz.; tincture of cantharides 1 teaspoonful; oil of origanum and bergamotte, of each 10 drops. *Proc.* Melt the suet, and when nearly cold, add the rest and stir until set.

BALDWIN'S PHOSPHORUS. *Prep.* Evaporate to dryness an aqueous solution of nitrate of lime, and continue the heat until the nitrate be fused, in which state it must be kept for 5 to 10 minutes, and then poured out into an iron pot, previously made warm, and allowed to cool gradually; after which, break it into pieces and put it into well-stopped vials. *Prop.* After exposure to the sun for some time, it emits a beautiful white light in the dark.

BALLOONS. BALLOONING. *Syn.* BALLON (*Fr.*) AERONAUTICS, (the art of sailing in and navigating the air.) AEROSTATION, (*properly, weighing the air, but frequently used to imply the art of raising substances into the atmosphere by means of balloons.*) AERONAUT, (*literally, an air-sailor,*) *one who travels in a balloon. Hist.* There appears to have been an inherent desire in man, from the most remote antiquity to the present time, to assume a similar sovereignty over the air that he possesses over the sea. The story of Dædalus and the fate of Icarus, must be familiar to every classical reader. The account of the automaton dove, constructed by the geometer Archytas, appears to have been no fable. During the middle ages many attempts were made at flying, but it was not until the eighteenth century that any efforts of this nature were crowned with success. In the year 1782, the brothers Montgolfier constructed a balloon, which was inflated with the smoke produced from the combustion of damp straw, and in 1783, Pilatre de Rozier and the Marquis d'Arlandes ascended in a smoke balloon, from Paris, to an elevation of upwards of 3000 feet. In the beginning of 1784, MM. Charles and Robert ascended in a balloon filled with hydrogen gas, and after a flight of 90 minutes, alighted in safety. Other successful ascents followed, and no accident occurred until the young naturalist, Pilatre de Rozier, and his companion Romain, lost their lives in attempting to cross the channel from France to England. The machine on this occasion was double, having a large upper balloon filled with hydrogen, and a smaller one below (for the sake of raising or sinking the machine at pleasure) inflated with smoke. At a height of 3000 feet, the whole apparatus was discovered to be on fire, and the unfortunate aeronauts were precipitated to the ground. The victory of Jordan over the Austrians at Fleurus in 1794, is said to have been obtained from the knowledge he acquired of the enemy's movements by means of a balloon. An ascent, very interesting to science, was made by Biot and Gay Lussac in 1804, when an elevation of upwards of 13,000 feet was attained. A similar ascent was made soon after by Gay Lussac alone, when the enormous height of 23,040 feet was reached, or an elevation of upwards of 4¼ English miles, being higher than the highest peak of the Andes. Since that time to the present numerous ascents have taken place in most of the principal towns of England, and in the majority of these cases, the balloons have been inflated with coal gas, furnished by the gas works The feat of Mr. Green, who ascended in a gigantic balloon from

Vauxhall in November, 1836, and succeeded in safely conducting across the channel to Nassau in Germany, not only himself, but two companions and a ton of ballast, must be within the recollection of every one, and the more recent "*jugglery*" of Mr. Henson and his "*phantom*" aerial machine, must be still more familiar.

Principles of Ballooning. The weight of the body of air which a balloon displaces, must exceed the gross weight of the balloon and all its appendages. Pure hydrogen is 16 times lighter than common air at the earth's surface; but when prepared on the large scale for ballooning, it is only from 7 to 11 times lighter. (Cavendish.) Hence a bag, filled with this gas, will ascend to a position in the atmosphere where the latter possesses a similar density to itself, allowing, of course, for the addition to the gravity of the gas, occasioned by the weight of its envelope. It has been computed that a balloon of 60 feet diameter, filled with common hydrogen gas, prepared from iron filings and acid, on the large scale, and being 6 times rarer than the atmosphere, would raise a weight of nearly 7000 lbs., besides the weight of the gas case, while one of only 1½ feet in diameter would barely float, from the less proportion of gas to the weight of the case that contains it. The *aerostatic* power of balloons is proportional to their dimensions in the ratio of the cubes of their diameters. Balloons are made of larger size than required to contain the necessary quantity of gas, to allow room for its increase of bulk, as it rises into a rarer medium. A foot of gas, measured at the earth's surface, will fill a space of two feet at an elevation of 3½ miles. The carbureted hydrogen, supplied by the gas-works, is much heavier than hydrogen gas, and consequently, a balloon filled with the former has a much less ascensional power than when filled with the latter. *Materials, &c.* The fabric, of which *air balloons* are made, is strong, thin silk, covered with a varnish of Indian rubber. *Fire balloons* (on the small scale) are generally made of silver paper, and inflated by burning spirits of wine, by means of a sponge dipped therein, and suspended just within the mouth of the balloon. The following table of the diameters, surfaces, and capacities of spheres, as well as the remarks that follow, are taken from the Chemical Dictionary of Dr. Ure.

Table showing the relations between the diameters, surfaces, and capacities of spheres. By Dr. Ure.

Diameters.	Surfaces.	Capacities.
1	3·141	0·523
2	12·567	4·188
3	28·274	14·137
4	50·265	33·51
5	78·54	65·45
10	314·159	523·6
15	706·9	1767·1
20	1256·6	4189·
25	1963·5	8181·
30	2827·	14137·
40	5026·	33510·

Remarks. Having ascertained by experiment the weight of a square foot of the varnished cloth, we find, by inspection in the above table, a multiplier, whence we readily compute the total weight of the balloon. A cubic foot of atmospheric air weighs 527 grs., and a cubic foot of hydrogen about 40. But as the gas employed to fill balloons is never pure, we must estimate its weight at something more. And perhaps, taking every thing into account, we shall find it a convenient and sufficiently precise rule for aerostation, to consider every cubic foot of included gas to have by itself a buoyancy of fully one ounce avoirdupois. Hence, a balloon of 10 feet diameter will have an ascensional force of fully 524 oz. or 33 lbs. *minus* the weight of the 314 superficial feet of cloth; and one of 30 feet diameter, a buoyancy of fully 14,137 oz., or nearly 890 lbs. *minus* the weight of the 2827 feet of cloth. On this calculation no allowance need be made for the seams of the balloon.

BALLOON VARNISH. I. Good boiled linseed oil, if allowed a sufficient time to dry and harden, forms an excellent varnish for balloon cases.

II. Indian rubber 1 lb., (cut small;) oil of turpentine 6 lbs.; boiled drying oil 1 gallon. *Proc.* Digest the Indian rubber in the turpentine, in a warm place, for a week, frequently shaking the vessel during the whole time, then place it in a water bath and gradually heat it until the solution be completed; next add the oil, previously made warm, gently simmer for five minutes, stirring all the while, after which closely cover it over, and when cold strain it through flannel.

III. *Ing.* Birdlime 1 lb.; boiled linseed oil 3 pints; turpentine q. s. *Proc.* Boil the birdlime with 1 pint of the oil in an iron pot, over a slow fire, for about half an hour, or until the former ceases to cackle, then add the rest of the oil, previously heated, and again boil for about one hour, stirring well all the time, being careful that it does not boil over, as it is very liable to do so. When it has boiled sufficiently, may be known by its admitting of being drawn into threads between two knives. As soon as this occurs, remove the pot from the fire, and when cooled a little, add a sufficient quantity of spirits of turpentine (warm) to reduce it to a proper consistence, and work it well up.

Remarks. These varnishes are better applied lukewarm to the silk, previously stretched out tight. In about 24 hours they will dry.

BALLS, ALTERATIVE, (for Horses.) *Prep.* I. *Ing.* Calomel ½ oz.; powdered aloes 1½ oz.; starch 6 oz.; soft soap 8 oz. *Proc.* Make them into a mass, and divide into 12 balls. *Use.* To improve the constitution.

II. *Ing.* Tartar emetic and powdered ginger, of each 5 oz.; powdered opium and calomel, of each 1 oz.; treacle to mix. Divide into 16 balls.

III. Powdered Barbadoes aloes, ginger, and liquorice, of each 2 oz.; all in powder; Castile soap 2 oz.; treacle to mix; divide into 6 balls. *Use.* For grease.

IV. Barbadoes aloes, emetic tartar, and liquorice, of each 1 oz.; Castile soap, 2 oz.; treacle to mix. For 4 balls. *Use.* For strangles.

V. Calomel, sulphuret of antimony, and powdered opium, of each ½ oz.; powdered gum guaiacum 2½ oz.; Castile soap 12 oz.; treacle to mix. Divide into 12 balls. *Use.* For weak horses with a bad constitution.

VI. Calomel ½ oz.; cascarilla and rhubarb, of each 1 oz.; aloes and soap, of each 4 oz.; treacle to mix. For 12 balls. *Use.* For weak horses.

BALLS, ANODYNE, (FOR HORSES.) Opium and camphor, of each ¼ oz.; aniseed powder 2 oz.; ginger 1 oz.; oil of caraways ¼ oz.; Castile soap 1½ oz.; treacle to mix. Divide into 3 balls. *Warming, Composing.*

BALLS, ASTRINGENT, (FOR HORSES.) I. Opium ¼ oz.; carbonate of soda 1 oz.; powdered cassia and ginger, of each ½ oz.; powdered gentian 2 oz.; treacle to mix. For 4 balls. *Tonic and binding.*

II. Opium ½ oz.; ginger ¼ lb.; prepared chalk ½ lb.; treacle to mix. For 10 balls. *For looseness.*

III. Gum catechu ¾ oz.; powdered ginger 1 oz.; powdered liquorice 2 oz.; soft soap to mix. For 3 balls. *Astringent* and *tonic.*

BALLS, BITTER. *Ing.* Powdered gentian 2 lbs.; extract of gentian 1 lb.; treacle q. s. *Proc.* Beat the ingredients to a hard mass, and make it into ½ lb. rolls. *Use.* Substituted for hops by fraudulent brewers.

BALLS, BLACK. *Syn.* BLACKING BALLS. I. Beeswax 8 oz.; resin 1 oz.; tallow ½ oz.; melt together, then add gum arabic 1½ oz.; dissolved in water 2 oz.; and as much lamp-black as necessary to color; stir until nearly cold, then run it into tin moulds.

II. Lard and wax, each 1 oz.; ivory black, lampblack, and brown sugar, of each 8 oz.; best size 4 oz.; mix as above.

III. Ivory black 16 oz.; gum tragacanth 2 oz.; sugar candy 4 oz.; water 16 oz.; mix with heat.

IV. Ivory black and lampblack, of each 16 oz.; thick mucilage of gum arabic 7 oz.; brown sugar 6 oz.; melted glue 1 oz.; water 1 quart, as above.

V. Suet 4 oz.; beeswax and sweet oil, 1 oz. each; sugar candy and gum arabic, both in fine powder, 1 drachm each; melt together over a slow fire, then add one tablespoonful of turpentine, and enough lampblack to produce a good color. Mould as above. *Use.* For blacking leather.

BALLS, BREECHES. *Ing.* Bath brick 1 lb.; pumice-stone ½ lb.; all in fine powder; ox-gall 6 oz. *Proc.* Make them into a paste, with a little water, if required, and mould them of any shape you please.

II. Mix together equal parts of whiting and pipeclay, to which some coloring may be added. *Remarks.* Rose pink, yellow ochre, umber, Irish slate, or any other similar coloring matter may be added to produce the desired tint.

BALLS, CAMPHOR, (FOR HORSES.) I. Camphor 1 oz., (reduce it to powder by adding a little spirit and rubbing it in a mortar;) powdered nitre 4 oz.; liquorice powder 1 oz.; treacle to mix. For 4 balls. *Anodyne* and *diuretic.*

II. Omit the nitre, and add 4 oz. more liquorice powder. *Anodyne.*

BALLS, CLOTHES. I. Pipeclay 2 lbs.; fuller's earth 1 lb.; whiting ½ lb.; white pepper 3 oz.; mix with water.

II. Fuller's earth 2 lbs.; curd soap 1 lb.; ox-galls sufficient to make a stiff dough, with which form balls.

Use. To remove grease from cloth and to clean clothes.

BALLS, COLIC, (FOR HORSES.) Powdered opium ¼ oz.; Castile soap and camphor, each 1 oz.; powdered ginger and cassia, each ½ oz.; liquorice powder 2 oz.; treacle to make 4 balls.

BALLS, CORDIAL, (FOR HORSES.) Aniseed, caraway-seed, and cumin-seed, of each 4 lbs.; ginger 2 lbs.; all in powder; treacle q. s. to mix. Product 21 lbs. To be made up into balls weighing 1¾ oz. each.

II. Powdered ginger 1 lb.; liquorice powder 3 lbs.; whiting 2 lbs.; powdered opium 1 oz.; oil of caraway ½ oz.; oil of cassia ¼ oz.; oil of nutmegs and cloves, each 1 drachm; treacle to mix. Divide into balls 1½ oz. each.

III. Starch and powdered ginger, of each ½ lb.; oils of caraway, cassia, and cloves, of each ¼ oz.; treacle to mix. Divide into 12 balls. *Use.* As a cordial after looseness, (especially No. II.,) during colds, &c.

BALLS, COUGH, (FOR HORSES.) I. Cordial ball mass 4 lbs.; gum ammoniacum 4 oz.; powdered squills 1 oz.; treacle to mix. Divide into 4 dozen balls.

II. Powdered ipecacuanha 1 oz.; powdered squills, camphor, and oil of aniseed, of each ½ oz.; liquorice powder 16 oz.; treacle to mix. For 12 balls.

III. Gum ammoniacum 3 oz.; powdered squills 1 oz.; camphor ¾ oz.; opium ½ oz.; powdered ginger 2 oz.; oil of aniseed 5 drachms; treacle to mix. For 8 balls.

BALLS, CREAM. White curd soap 1 lb.; powdered starch 3 oz.; beat together, weigh into 1 oz. balls, and roll them in powdered starch. *Use* For cleaning the hands.

BALLS, DIAPHORETIC, (FOR HORSES.) I. Antimonial powder 1 oz.; camphor ¾ oz.; starch 6 oz.; mix with treacle, and divide into 6 balls.

II. Tartar emetic and camphor, of each ¼ oz.; liquorice powder 2 oz.; make them into two balls, with treacle.

III. Camphor 1 oz.; sal ammoniac 3 oz.; liquorice powder 2 oz.; oil of aniseed ¼ oz.; soft soap 8 oz.; beat together, and divide into 6 balls.

BALLS, DIURETIC, (FOR HORSES.) I. Soft soap and Venice turpentine, of each 4 oz.; powdered nitre 2 oz.; oil juniper, ½ oz.; liquorice powder 3 oz. Divide into 8 balls.

II. Powdered nitre, rosin, and soft soap, of each 4 oz.; liquorice powder 5 oz.; oil of juniper 1 oz.; treacle to mix. For 12 balls.

III. Powdered rosin 6 lbs.; nitre 4 lbs.; soft soap and Venice turpentine, of each 1 lb.; oil of juniper 1 oz.; treacle to mix. Weigh into 1¾ oz. balls.

BALLS, FARCY, (FOR HORSES.) Corrosive sublimate 10 grains; liquorice powder 1 oz.; oil of aniseed ½ a drachm; mix with treacle for 1 ball.

II. Calomel 1 oz.; powdered opium ½ oz.; liquorice powder 12 oz.; mix with treacle for 12 balls.

BALLS, FEVER, (FOR HORSES.) Tartar emetic 2 oz.; nitre 8 oz.; liquorice 6 oz.; all in fine powder; mix with treacle for 12 balls.

II. Nitre and tartar emetic, of each 1 lb., in fine powder; powdered digitalis 4 oz.; antimonial powder 8 oz.; liquorice powder 1½ lb.; treacle to mix. Divide into balls weighing 1 oz. 3 drs. each.

BALLS, FURNITURE. I. Melt together in a pipkin 1 lb. of beeswax and ¼ oz. of alkanet root until the former be well colored; then add linseed oil and spirits of turpentine, of each ½ pint. Strain through a piece of coarse muslin.

II. Linseed oil 1 pint, alkanet root 2 oz.; heat them together until a proper color be produced, strain, and add yellow wax 1¼ lb., and rosin 2 oz. *Use.* For polishing furniture.

BALLS, GARLICK, (FOR HORSES.) Garlick 1 oz.; liquorice powder enough to make a ball. *Use.* For chronic coughs.

BALLS, GRIPE, (FOR HORSES.) Liquorice, black pepper, ginger, and prepared chalk, all in powder, of each 4 oz.; oils of caraway, cloves, and cassia, of each 1 drachm; treacle to mix. For 12 balls.

BALLS, INFLUENZA, (FOR HORSES.) Barbadoes aloes, nitre, and Venice turpentine, of each 1 lb.; gentian 2 lbs.; ginger ½ lb.; treacle to mix. Divide into 1½ oz. balls.

BALLS, LAXATIVE, (FOR HORSES.) I. Aloes, ginger, and soft soap, of each 3 drachms; mix with treacle for 1 ball. Cordial and laxative.

II. Flowers of sulphur ¾ lb.; powdered antimony 2 oz.; calomel 1 oz.; powdered ginger 3 oz.; treacle to mix for 12 balls.

BALLS, MANGE, (FOR HORSES.) Crude antimony 2 oz.; calomel 1 oz.; opium ½ oz.; flowers of sulphur 1 lb.; mix with treacle and divide into 12 balls. *Remark.* A piece the size of a horse bean to that of a small nut, is a capital medicine for dogs.

BALLS, MERCURIAL, (FOR HORSES.) I. Calomel 1 oz.; aloes 2 oz.; rhubarb ¾ oz.; liquorice powder 14 oz.; treacle to mix. Divide into 12 balls. Laxative and alterative.

II. Strong mercurial ointment ¼ lb.; powdered ginger 3 oz.; liquorice powder 10 oz.; treacle to mix for 12 balls.

BALLS, PHYSIC. *Syn.* PURGING BALLS, (FOR HORSES.) Barbadoes aloes 5 oz.; hard soap 3 oz.; ginger and olive oil, of each 1 oz.; melt together in a ladle, and while warm, divide into 6 balls.

II. Aloes and hard soap, of each 5 oz.; pearlashes 1 oz.; powdered ginger 2 oz.; melt as above for 8 balls.

BALLS, SCOURING. I. *Ing.* Curd soap 8 oz.; oil of turpentine and ox-gall, of each 1 oz. *Proc.* Melt the soap, and when cooled a little, stir in the rest, and make it into cakes while warm.

II. Soft soap and fuller's earth, each 1 lb.; beat them well together in a mortar, and form into cakes. *Use.* To remove grease, &c., from cloth. The spot first moistened with water is rubbed with the cake, and allowed to dry, when it is well rubbed with a little warm water, and afterwards rinsed or rubbed off clean.

BALLS, STOMACHIC, (FOR HORSES.) Powdered gentian, 4 oz.; powdered ginger and carbonate of soda, each 2 oz.; soft soap 8 oz.; mix and divide into 8 balls.

II. Powdered quassia, myrrh, soda, aloes, and rhubarb, of each 2 drachms; oil of cloves 10 drops; treacle to mix for 1 ball.

III. Aloes ½ oz; rhubarb and ginger, each ¼ oz.; calomel 1 drachm; oil of caraway 10 drops; soft soap 3 drachms; for 1 ball.

BALLS, STRENGTHENING, (FOR HORSES.) Powdered calomba and cascarilla, of each ¼ oz.; soft soap ¾ oz.; chalk ½ oz.; make into a ball, *for looseness, &c.*

II. Powdered gentian 2 oz.; sulphate of iron and myrrh, of each 1 oz.; liquorice powder 4 oz.; treacle to mix. For 8 balls.

BALLS, SULPHUR, (FOR HORSES.) Flowers of sulphur 1 lb.; powdered antimony 3 oz.; red sulphuret of mercury (pure) 2 oz.; powdered gum 1 oz.; treacle to mix. For 12 balls. Said to make the coat sleek; also for mange, &c.

BALLS, SWEET. *Syn.* POMAMBRA. I. *Ing.* Florentine orris root 3 oz.; cassia 1 oz.; cloves, rhodium wood, and lavender flowers, of each ½ oz.; ambergris and musk, of each 6 grs.; oil of verbena 10 drops. *Proc.* Make them into balls with mucilage of gum tragacanth made with rose-water.

II. Gum benzoin and styrax, of each 1 oz.; cloves and cassia, of each ¼ oz.; musk and civet 5 grs.; balsam of Peru, oil of verbena, oil of rhodium, otto of roses, and true neroli, of each 10 drops; Florentine orris root 2 oz. *Proc.* Reduce the dry articles to powder, then add the essences, and make the whole into balls with essence of jessamine, jonquil, violet, and tuberose, of each equal parts.

III. Plaster of Paris 4 oz.; sandal wood, cyperus root, and cloves, of each ½ oz.; gum benzoin and styrax, of each 1 oz.; ivory-black 2 oz.; musk and civet, of each 1 scruple; ambergris 10 grains; balsam of Peru ½ oz.; oil of cassia 10 drops; oil of rhodium ½ a drachm; essence of jasmin ¼ oz.; essence of neroli ½ a drachm; otto of roses 15 drops; mucilage made with orange-flower water to mix. *Proc.* Make them into beads, and pierce them while soft.

Use. Worn in the pocket as a perfume. Some persons varnish them, but that keeps in the smell.

BALLS, TONIC, (FOR HORSES.) Gentian ½ oz.; opium ½ a drachm; cascarilla, myrrh, and carbonate of soda, of each 1 drachm; soft soap ½ oz. Form into a ball.

II. Calomba 2 oz.; cassia ½ oz.; allspice ½ oz.; treacle to make 2 balls.

III. Powdered bark 8 oz.; gentian 2 oz.; salts of tartar 1 oz.; opium ½ oz.; liquorice powder and iron filings, of each 3 oz.; treacle to make 12 balls. If the horse is costive, omit the opium.

IV. Sulphate of iron 4½ oz.; powder of calomba 5 oz.; do. of cascarilla 3 oz.; soft soap 8 oz. For 12 balls.

V. Sulphate of iron, myrrh, and gentian, of each, ½ oz.; ginger ½ oz.; carbonate of soda 3 drachms; treacle to make 1 ball. The last three are suited for washy horses.

VI. Gentian 8 oz.; ginger 4 oz.; opium ¾ oz.; nitre 3 oz.; oil of caraway ½ oz.; liquorice powder and treacle to make 12 balls. For excessive staling.

VII. Sulphate of iron and sulphate of copper, of each, 1 drachm; Venice turpentine 1 oz.; ginger and cassia, of each, ¼ oz.; liquorice powder to make 2 balls. For incontinence of urine.

BALLS, WORM, (FOR HORSES.) I. Aloes 5 drachms; Castile soap ½ oz.; calomel and ginger, of each, 1½ drachms; oil of cloves and cassia, of each, 6 drops; treacle to make a ball. II.

Aloes, powdered tin, ginger, and soft soap, of each, ½ oz.; oil of cloves 15 drops. Make a ball.

BALLS, WASH, (MOTTLED.) I. (*Red.*) Cut white curd or Windsor soap, not too dry, into small square pieces, and roll them in a mixture of powdered bole and starch, or bole alone; then squeeze them into balls without mixing the color more than is necessary.

II. (*Blue.*) Roll the pieces in powdered blue, and proceed as before.

III. (*Green.*) Roll the pieces in a mixture of powdered blue and yellow ochre.

Remarks. In this way, by varying the color of the powder, mottled wash-balls of any color may be produced.

BALM OF GILEAD. *Syn.* BALSAMÆLEON. OPOBALSAM. OIL OF BALSAM. BALM OF MECCA. BALSAMUM JUDAICUM. The genuine balsam of Mecca is the juice of the amyris gileadensis, and is obtained by cutting the bark of the tree with an axe. It is both scarce and costly, and *none* of it ever reaches this country as an article of commerce. "There are only two shops in Constantinople at which the genuine balsam can be obtained. Its price is exorbitant, one grain being charged 5 Turkish piastres = 1s. 0½d." That which is sent to England is obtained by boiling the twigs of the balsam tree in water. The real balsam of Mecca is of a clear gold color, and possesses a penetrating and delicate fragrance, and a sharp bitter astringent taste. A drop let fall on the surface of hot water spreads itself over the whole surface, like a thin film of oil, and again contracts on the water cooling. It dissolves completely in fatty and essential oils, which then assume the peculiar flavor of the balsam. *Use.* It is thought to be antiseptic, stimulant, and vulnerary, and that its fumes prevent barrenness. It is employed in the east as a cosmetic and perfume. When applied to the skin it causes redness and swelling.

BALM OF GILEAD, FACTITIOUS. The article met with in trade under the name of balm of Gilead is either the article alluded to above or a spurious kind prepared by one of the formulæ below.

I. *Ing.* Yellow rosin 10 oz.; tincture of benzoin and oil of lemons 3 oz. each; oils of caraways and rosemary, of each, 2 oz. *Proc.* Melt the rosin; then remove it from the heat, and stir in the tincture; lastly, add the essential oils.

II. Yellow rosin 1 lb.; gum benzoin (bright) 4 oz.; best liquid styrax 2 oz.; essence of lemons 3 oz.; oil of rosemary 2 oz.; oils of caraways and cassia, each, 1 oz. *Proc.* Keep the rosin melted by a gentle heat for 15 minutes; then remove the heat, and add the benzoin, previously powdered and rubbed up with an equal weight of tincture of benzoin, and when thoroughly incorporated add the rest; reduce it to a proper consistence with spirit of wine, and strain through flannel.

III. Balsam of Canada 16 oz.; gum benzoin, bright and clear, 5 oz.; oils of lemons, rosemary, and cassia, of each, ¼ oz. Powder the benzoin, and well mix it with the Canada balsam; then place the mixture in a flask, and after closing the mouth expose it to the heat of a water-bath, until the liquid will dissolve no more of the benzoin; next allow it to settle until clear and cold, and then add the essences.

BALSAM. *Syn.* BAUME, (*Fr.*) BALSAME, (*Ger.*) Balsams are semi-liquid resinous substances, having for the most part the consistence of honey. Some, however, are solid, and the greater number harden by exposure to the air and age. They are generally aromatic, soluble in alcohol, partly soluble in ether, and not at all so in water. Their usual constituents are resin and benzoic acid, mixed with a large portion of aromatic essential oil. Some of the substances falsely called balsams contain no benzoic acid, as the balsam of copaiba, &c.; and many preparations, from the presumption that they possess balsamic qualities, have also received this name.

BALSAM, ACOUSTIC. *Prep.* I. Tincture of benzoin, tincture of castor, and tincture of opium, of each, 1 oz.; essential oil of asafœtida 5 drops. Mix.

II. (BAUME'S.) Tinctures of ambergris, asafœtida, castor, and opium, of each, 1 oz.; terebinthinated balsam of sulphur and oil of rue, of each, 15 drops. Mix.

Use. In atonic deafness, 1 or 2 drops poured into the ear; or a piece of cotton wool moistened therewith, is introduced instead.

BALSAM OF AMBER. The thick oil left in the retort after rectifying oil of amber. The properties are similar to oil of amber.

BALSAM, ANODYNE, (BATE'S.) *Prep* Castile soap, in shavings, 3 oz.; camphor 2 oz.; powdered opium ½ oz.; hay saffron and oil of rosemary, of each, 1 drachm; rectified spirit 1 pint. *Proc.* Digest (with agitation) for 10 days.

II. Soft soap 1½ lb.; powdered opium and camphor, of each, ¼ lb.; oil of rosemary ½ oz.; rectified spirit 1 gallon. As above.

III. Opodeldoc 3 oz.; laudanum 1 oz.; mix. *Use.* As an anodyne and rubefacient for sprains, &c. *Dose.* 20 to 40 drops.

BALSAM, CANADA. This balsam is the product of the Canadian balsam fir, (the abies balsamea,) a tree of very common growth in Canada and the State of Maine, (U.S.) When fresh, it has the consistence of thin honey, an agreeable odor, an acid taste, and a pale yellow color, nearly white.

Pur. It should be perfectly transparent, and soluble in rectified oil of turpentine, with which it forms a beautiful glassy and colorless varnish, which is much used for preparing a semi-transparent copying-paper. A factitious kind is sold, but is wholly deficient of some of the properties of the genuine balsam.

BALSAM, CANADA (FACTITIOUS.) *Prep.* Dissolve 3 lb. of clear yellow resin in 1 gallon of oil of turpentine; then add ½ pint of pale linseed oil, and ¼ oz. each of essence of lemon and oil of rosemary.

BALSAM OF COPAIBA. The oleoresinous juice of the copaifera officinalis.

Pur. As this substance is frequently adulterated, and sometimes a factitious article is sold instead, it becomes important to be able to ascertain its purity.

1. The Ed. Ph. states that it should be "transparent, free of turpentine odor when heated, soluble in 2 parts of alcohol, and dissolve one fourth

of its weight of carbonate of magnesia when heated, and continue translucent."

2. Place a drop of the balsam on a piece of unsized paper, and heat it until all the essential oil be expelled; it should then form a semi-transparent *well-defined spot;* but if the balsam has been adulterated with a fat oil, it will be surrounded by an oily areola. (Chevallier.)

3. Shaken with liquid ammonia, sp. gr. ·965, it becomes clear and transparent in a few moments. (Planche.)

4. 2½ parts of balsam with 1 of liquor of ammonia, form a transparent mixture, which may be heated to 212° without becoming opaque. (Vigne.)

5. Boiled with 50 times its weight of water for 1 hour, it should lose at least half its weight. (Vigne.)

6. Two samples of balsam from Para, which were considered to have been purposely adulterated with rancid oil of almonds, dissolved well in alcohol, but combined badly with magnesia and ammonia. Direct experiments showed that pure copaiba balsam may be adulterated with 50 per cent. of a fat oil (nut oil, almond oil) without its ceasing to give a clear solution in 2 parts of alcohol. Only after 12 to 15 hours does the oil separate. Excess of alcohol separates the oil in all cases. It is evident, therefore, that under certain circumstances an unadulterated balsam may be insoluble or of difficult solution in alcohol; an adulterated one, on the contrary, may be soluble. The best test for detecting the fat oils would be alcohol to which some caustic potash has been added. (Journ. de Pharm., 1842, p. 52.)

Use. Balsam of copaiba is considered detersive, vulnerary, diuretic, and astringent; and appears to possess a sort of specific power over diseases of the mucous membranes of the urino-genital organs. *Dose.* 20 to 60 drops on sugar, or floating on water, to which 30 or 40 drops of elixir of vitriol has been added. It may be taken 3 or 4 times daily, if the stomach will bear it. A few drops of sweet spirits of nitre and laudanum are a good addition to allay the nausea. It is also given in the form of sirup, mixture, pills, and clyster.

Remarks. Numerous preparations of this article are continually being puffed off by certain advertising druggists; as "*soluble copaiba,*" "*specific solution,*" "*salt of copaiba,*" &c.; but *none* appear to possess equal activity and certainty to the natural balsam. As the whole virtue of copaiba as a medicine depends upon the essential oil it contains, the value of any of these preparations may be estimated by the quantity of that article which is found in them. In the case of the first two articles above mentioned, the quantity is *very small indeed,* and in the latter it is *wholly deficient.* Hence the large doses of those articles that may be taken with impunity, as far as their balsamic properties go, always, of course, excepting the danger of burning a hole through the coats of the stomach with the large quantity of caustic potassa which they usually contain.

BALSAM COPAIBA, ENEMA OF. (VELPEAU.) *Prep.* Balsam of copaiba ¼ oz.; yelk of 1 egg; distilled water 8 oz. Make an emulsion, and add 20 to 30 drops of laudanum.

BALSAM OF COPAIBA, FACTITIOUS. *Prep.* Powdered gum benzoin 4 oz.; castor oil 1 gallon; yellow rosin 3 lbs.; balsam of Canada 2 lbs.; oil of juniper 2 oz.; oil of savine 1 oz.; essences of orange and lemon, of each ½ oz. *Proc.* Melt the rosin, then add a little of the castor oil and the powdered benzoin, and withdraw the heat; when well mixed add the remainder of the castor oil, and when nearly cold the essences; mix well, and filter through a Canton flannel bag, adding a little coarsely-powdered charcoal.

II. Balsam of Canada 8 lbs.; yellow rosin 2 lbs.; castor oil 3 lbs.; oil of juniper ½ oz.; essential oil of almonds 15 drops; oil of savine 20 drops. As above.

III. Balsam of Canada 9 lbs.; yellow rosin 1 lb.; Venice turpentine 2 lbs.; oils of rosemary, juniper, and savine, 1 drachm each; essential oil of almonds 15 drops.

IV. Balsam of Canada 3 lbs.; Venice turpentine 1 lb.; oils of fennel, juniper, and savine, of each q. s.

Remarks. The above compounds may easily be distinguished from the genuine balsam, by any one acquainted with the characteristics of the latter.

BALSAM OF COPAIBA, REDUCED. Balsam of copaiba 4 lbs.; castor oil 3 lbs. Mix.

II. Balsam of copaiba 7 lbs.; castor oil 4 lbs.; yellow rosin 2 lbs.

III. Equal parts of balsam of copaiba and balsam of Canada mixed together.

IV. To the last add 2 lbs. of Venice turpentine.

V. Balsams of Canada and copaiba, and nut or castor oil, equal parts.

VI. Copaiba 7 lbs.; nut oil 3 lbs.; yellow rosin 2 lbs.; balsam of Canada 1 lb.

Remarks. The above are the forms for the reduction of copaiba balsam, that have from time to time been circulated in the drug trade. For the mode of distinguishing such compounds from the pure balsam, see BALSAM OF COPAIBA.

BALSAM OF COPAIBA, RESIN OF. The residuum left from the process of distilling the oil of copaiba from the balsam. (See OILS, OIL OF COPAIBA.) *Prop., Use, &c.* It consists principally of copaibic acid. It has been recommended for gonorrhœa, but appears to be nearly inert. I once foolishly swallowed, out of bravado, nearly ½ oz. of this resin, without experiencing any sensible effects in consequence.

BALSAM OF COPAIBA, SIRUP OF. *Prep* Rub 4 oz. of copaiba with 32 grs. of calcined magnesia, 64 drops of oil of peppermint, and a little simple sirup; when thoroughly mixed, add enough of the latter to make up the whole quantity to 62 oz.

BALSAM, GODBOLD'S VEGETABLE. *Prep.* Lump sugar 1 lb.; vinegar ½ pint; garlic ½ oz.; tincture of tolu 1 teaspoonful; rectified spirit 3 oz. *Proc.* Steep the garlic in the vinegar for 3 or 4 days, then strain off the clear and dissolve the sugar therein, after which add the other ingredients and shake them well together.

BALSAM, GREEN. *Prep.* Linseed oil 8 oz.; gum elemi 2 oz.; verdigris powdered ½ oz. *Proc.* Melt together and strain. *Use.* The same as green oil.

BALSAM OF GUAIACUM. *Prep.* Gum

guaiacum in coarse powder 16 oz.; balsam of Peru ½ oz.; rectified spirit 1 quart. *Proc.* Macerate for 10 days, frequently shaking the mixture.

Use. As a diaphoretic. *Dose.* 30 to 60 drops. Externally antisuppurative.

BALSAM OF HONEY. *Prep.* I. Balsam of tolu 2 oz.; gum storax and powdered opium, of each ½ oz.; honey 8 oz.; rectified spirit 1 quart. *Proc.* Mix well together, and agitate occasionally for 3 or 4 days, then decant the clear and filter the residuum. *Use.* As a pectoral, in tickling coughs. *Dose.* 1 to 2 teaspoonfuls.

II. (*Hill's.*) *a.* Balsam of tolu 1 lb.; honey 2 lbs.; rectified spirit 1 gallon. Dissolve.

b. Balsam of tolu 1 oz.; styrax 1 drachm; opium 2 drachms; honey ¼ lb.; rectified spirit 1 pint, as above. *Dose.* Half to a whole teaspoonful. As a pectoral in coughs and colds.

BALSAM OF LEAD. *Prep.* Sugar of lead 2 oz.; oil of turpentine 1 pint. *Proc.* Heat them together for half an hour, and then pour off the clear. *Use.* As a cooling external application.

BALSAM, LOCATELLE'S. *Prep.* I. Yellow rosin, olive oil, and Venice turpentine, of each 1 lb.; shavings of red Sanders wood 1 oz. *Proc.* Boil to the consistence of a thin ointment, and strain.

II. Yellow wax 4 oz.; olive oil and Venice turpentine, of each 1 lb.; alkanet root 2 oz.; as last.

Use. As a pectoral in coughs and colds. *Dose.* ½ to 1 teaspoonful mixed with the same quantity of conserve of roses.

BALSAM, PECTORAL. *Prep.* Tincture of tolu, and compound tincture of benzoin, of each 2 oz.; rectified spirit 4 oz. Mix. *Use.* As a pectoral in coughs and colds. *Dose.* A teaspoonful.

BALSAM OF PERU. *Prep. and Source.* Genuine balsam of Peru is obtained by boiling the bark and branches of the myrospermum peruiferum in water. It should possess the following characteristics:

Pur. and Tests. I. Balsam of Peru should have a consistence and appearance resembling treacle, and an aromatic odor between that of benzoin and vanilla. II. It should be entirely soluble in alcohol. III. It should undergo no diminution in volume when agitated with water. IV. 1000 parts of the balsam should saturate exactly 75 grains of pure crystallized carbonate of soda. V. Its sp. gr. should not be less than 1·150, nor more than 1·160.

Remarks. Like most other costly articles, it is both imitated and adulterated. The following are the formulæ adopted for this purpose, but the articles so produced will not answer to the above tests.

BALSAM OF PERU, FACTITIOUS. *Prep.* Balsam of tolu 1 lb.; gum benzoin 3 lbs.; liquid storax 1 oz.; rectified spirit q. s. *Proc.* The gum benzoin in coarse powder is dissolved in a little of the spirit, and then mixed up with the balsam of tolu and storax, adding as much spirit as is necessary to reduce it to a proper consistence.

BALSAM OF PERU, REDUCED. *Prep.* Balsam of Peru 3 lbs.; balsam of tolu 2 lbs.; rectified spirit enough to reduce it to a proper consistence. As above.

II. Balsam of Peru 3 lbs.; gum benzoin (dissolved in the least quantity of spirit possible) 1 lb. As above.

BALSAM, RIGA. *Syn.* Baume de Carpathes. (*Fr.*) Balsamum Libani. (*Lat.*) True Riga balsam is a pellucid white fluid, obtained from the shoots of the pinus cembra. It smells and tastes strongly of oil of juniper, and like that article is powerfully diuretic and vulnerary. The bottoms of oil of juniper thinned with spirit are generally sold for it. The spiritus turionum pini is also commonly called Riga balsam.

BALSAM, RIGA. *Syn.* Spiritus Turionum Pini. *Prep.* I. Young shoots of Scotch fir (collected in March) 2 lbs.; rectified spirit and water, of each 5 pints. *Proc.* Bruise the fir-shoots and macerate in the spirit and water for 3 or 4 days, then distil 1 gallon.

II. (*Extemporaneous.*) Mix together, rectified spirit 8 oz.; oil of juniper and compound tincture of benzoin, of each 1 oz.; agitate well and filter. *Prop., Use, &c.* Stimulant and diuretic; also used for sprains and bruises.

BALSAM OF SULPHUR. *Syn.* Oil of Sulphur. Sulphureted Oil. *Prep.* I. Flowers of sulphur 1 lb.; olive oil 8 lbs. *Proc.* Heat them together in a large iron pot, and stir until they combine. (P. E.)

II. Flowers of sulphur 1 lb.; linseed oil 1 gallon.

BALSAM OF SULPHUR, ANISATED. *Prep.* I. Dissolve 1 oz. of flowers of sulphur in 4 oz. of oil of aniseed.

II. Balsam of sulphur 12 oz.; oil of aniseed 4 oz. Mix.

Use, Dose, &c. Balsam of sulphur is said to possess expectorant and diaphoretic qualities, and has been given in doses of 40 to 50 drops, in diseases of the lungs, and used externally as an application to foul ulcers. Its disagreeable taste and smell have, however, almost precluded its use. The last two formulæ are pectoral, in doses of 10 to 30 drops.

BALSAM, THIBAULT'S. *Prep.* Myrrh, aloes, and dragon's blood, of each 1 drachm; flowers of Saint John's wort 1 handful; spirit of wine ½ a pint; Canada balsam ½ oz. *Proc.* Digest the flowers in the spirit for 3 days, then express the liquor and dissolve the other ingredients therein. *Use.* To heal cuts and wounds, and to stop bleeding Internally diuretic, in doses of 1 to 2 teaspoonfuls, given in gonorrhœa.

BALSAM OF TOLU. This substance is obtained from the myrospermum toluiferum, and when fresh, is a soft, translucent, tenacious, and resinous-looking mass, of a reddish or yellowish brown color, a fragrant odor, and a sweetish taste. It is *perfectly* soluble in alcohol, forming a *transparent* solution. By exposure to the air it becomes hard and brittle. It is frequently adulterated, in which case it has a *weaker smell*, is *less soluble in alcohol*, and the *tincture formed with that fluid is opaque*.

BALSAM OF TOLU, FACTITIOUS. *Prep.* Orange shellac and gum benzoin, of each 1 lb. in coarse powder; dissolve in rectified spirit 5 lbs., (in a close vessel;) filter and distil off the spirit until the residuum has a proper consistence, then add a few drops of the oils of cassia and nutmeg, dissolved in a little essence of vanilla.

BALSAM OF TOLU, (REDUCED.) I. Balsam of tolu 1 lb.; mix it by a gentle heat in a close vessel with 1½ lb. of the brightest and clearest pieces of gum benzoin reduced to a coarse powder,

and soften with a little tincture of vanilla and spirit of wine.

II. Equal parts of balsam of tolu, benzoin, orange shellac, and spirit of wine, mixed together by a gentle heat, and flavored with a little essence of storax and essence of vanilla.

BALSAM OF TURPENTINE. *Prep.* Melt by a gentle heat black rosin 1 lb.; remove the vessel from the fire and add oil of turpentine 1 pint.

BAMBOO, ENGLISH. This is a sort of pickle prepared from the young shoots of elder in spring. *Prep.* The outer skin is peeled off, and they are immersed in salt water for 12 or 14 hours, then boiled in vinegar for a few seconds; they are next put into a jar with a little white pepper, ginger, mace, and pimento, and vinegar (boiling hot) poured over them; the jar is then well covered up, and set for about 2 hours in a hot place by the fireside, where it is kept scalding until the pickle is done.

Use. For making Indian pickle, also eaten with boiled mutton. The clusters of elder flowers, just before they open, also make a beautiful pickle.

BANDANNA. This is a species of calico printing distinguished by light, or white figures or spots on a dark ground, and has been practised in India from time immemorial. Formerly bandanna handkerchiefs were wholly imported from India, but of late years those of British manufacture have entirely superseded them. The latter are not only much cheaper, but also vastly superior in quality. At the works of Messrs. Monteith and Co. at Glasgow, no less than 1600 pieces, or 19,200 yards of cotton, are converted into bandannas in the short space of 10 hours, by the labor of only 4 workmen. The machinery employed for this purpose is of the most ingenious description.

(*Process of printing Bandannas.*) A series of presses are arranged furnished with lead plates, out of which the pattern is cut, the pieces of cotton, dyed (generally) of a Turkey red, are then placed in, several at a time, and the presses put in action by hydraulic machinery, by which every part of the cloth, except where the pattern has been cut out of the lead plates, receives a pressure of upwards of 300 tons. A clear solution of chloride of lime is now admitted to the pattern, by properly arranged pipes, and after it has removed the color, which it does very rapidly, a stream of water is passed through the pattern, to wash off the bleaching solution, when the operation is complete. The pieces of cloth are then removed from the presses and others substituted, to undergo a similar operation.

BARBAROSSA'S PILLS. These are supposed to have been the first mercurial preparation employed in medicine. They consisted of quicksilver, rhubarb, musk, and amber.

BARCLAY'S ANTIBILIOUS PILLS. *Prep.* Colocynth 2 drachms; extract of jalap 1 drachm; almond soap 1½ drachms; gum guaiacum 3 drachms; emetic tartar 8 grs.; oils of juniper, caraway, and rosemary, of each 4 drops. *Proc.* Make the ingredients into a mass with sirup of buckthorn, and divide into 64 pills.

BAREGES WATER. *Prep.* Alum, carbonate of lime, and hard Spanish soap, of each 2 grs.; common salt 4 grs.; dried carbonate of soda 20 grs.; sulphuret of potassium 16 grs.; water 1 quart. *Proc.* Reduce the solid ingredients to powder, and boil them in the water until the fumes of sulphureted hydrogen begin to be evolved, then add enough water to make up 1 gallon. *Use.* As a medicated lotion or bath in cutaneous diseases, from the slightest eruption to the most obstinate cases of leprosy. *Remarks.* The above are the proportions for 1 gallon, but when a larger quantity of water is wanted, a proportionate weight of the materials may be dissolved in a little of the water, as above, and then added to the bath. This was the medicated warm bath used by the Emperor Napoleon.

BARIUM. The metallic base of the earth baryta, discovered by Sir H. Davy in 1808.

Prep. Make a paste with carbonate of baryta and water, and place a globule of mercury in a little hollow, formed in its surface. The whole must be then laid on a small platina tray, connected with the positive pole of a galvanic battery, of 100 double plates, while the negative wire must be inserted into the globule of mercury. An amalgam of barium is formed, which, on being heated in a vacuum, parts with its mercury and leaves the former metal pure.

Prop., &c. A dark gray colored metal, possessing little lustre, and decomposed by both air and water, absorbing oxygen, which converts it into the earth baryta.

BARIUM, BROMIDE OF. *Prep.* Boil together protobromide of iron and moist carbonate of baryta, in excess, evaporate the filtered solution and heat the residue to redness. *Remarks.* By the careful evaporation of a solution of this substance prismatic crystals may be obtained. It dissolves freely both in water and alcohol.

BARIUM, CHLORIDE OF. *Syn.* MURIATE OF BARYTA. HYDROCHLORATE OF DITTO. *Prep.* I. Carbonate of baryta ℥x; muriatic acid ½ pint; water 1 quart. *Proc.* Dilute the acid with the water, then dissolve the carbonate of baryta in it; evaporate and crystallize. (P. L.)

II. Sulphate of baryta ℔ ij; powdered charcoal ℥iv; muriatic acid q. s. *Proc.* Heat the sulphate of baryta to redness, then cool and powder; next add the charcoal, and expose the mixture in a covered crucible for three hours to a low white heat; cool and powder; lastly, dissolve in water, filter, and add muriatic acid until effervescence ceases. The solution may now be evaporated and crystallized as before. (P. E.)

Prop. Form; crystalline plates or tables, soluble in water, and fixed in the air. It communicates a greenish yellow color to flame. *Use.* Principally as a test for sulphuric acid, its solution causing a white precipitate in another, containing oil of vitriol or a sulphate. It has been given in scrofula, scirrhous cancer, skin diseases, &c. It is poisonous. Its antidotes are the same as those for baryta.

Remarks. The process of the London College is the simplest and most convenient. That of the Edinburgh requires to be conducted under a chimney, or in a strong current of air, to carry off the sulphureted hydrogen, evolved in large quantities, during the process. The form of the P. D. is similar to the Edinburgh.

BARIUM, FLUORIDE OF. *Syn.* HYDROFLUORATE OF BARYTA. A white powder formed

by digesting freshly-precipitated carbonate of baryta in hydrofluoric acid in *excess*.

BARIUM, IODIDE OF. *Syn.* Protiodide of Barium. Hydriodate of Baryta. *Prep.* I. Dissolve sulphuret of barium in water, and add iodine gradually, in *excess*, then filter and evaporate. (Phillips.)

II. Decompose an aqueous solution of iodide of iron by freshly-precipitated carbonate of baryta; filter, evaporate, and crystallize.

Use. An ointment made with 4 grs. of the iodide to 1 oz. of lard has been used in scrofula.

BARIUM, OXIDES OF. I. (Protoxide of Barium. *Syn.* Oxide of Barium. Barytes. Baryta.) When the metal, barium, is exposed to the action of either air or water this oxide is the sole product.

Prep. a. Strongly ignite the pure crystallized nitrate of baryta in a covered crucible.

b. Ignite, as before, a mixture of carbonate of baryta and charcoal in a blacklead crucible.

c. (*Hydrated.*) Precipitate a solution of either muriate or nitrate of baryta with another of caustic potassa or soda.

Prop. Obtained by the first two processes it forms a grayish white powder, having a very caustic and alkaline taste, and slaking, on the addition of water, like quicklime, but with the evolution of more heat. It then forms a bulky white powder, resembling that prepared by the last formula. It rapidly passes into the state of carbonate on exposure to air. *Use.* As a test for carbonic acid and for the formation of some salts. *Ant.* It is very poisonous. *The best antidotes* are water soured with sulphuric acid, or a solution of sulphate of soda, or sulphate of magnesia.

II. (Peroxide of Barium. *Syn.* Deutoxide of Barium.) *Prep. a.* Heat pure baryta to a dull red, and pass pure dry oxygen gas over it.

b. Heat pure baryta as above in a platina crucible, then gradually add one-fourth of its weight of chlorate of potassa. Afterwards wash off the chloride of potassium formed with cold water. The deutoxide remains as a white powder.

c. Heat nitrate of baryta to redness in an earthenware retort, having a tube attached to its nose, to convey off the liberated gases, to a trough of water, and continue the heat until nitrous fumes are no longer evolved. *Uses.* To make the oxygenized acids and peroxide of hydrogen. (Quesneville.)

BARIUM, PHOSPHURET OF. This is formed by exposing its constituents mixed together in atomic proportions, to a gentle heat in a glass tube.

BARIUM, SULPHURET OF. *Prep.* Mix together equal parts of sulphate of baryta and wheat flour or charcoal, and expose the mixture to a full white heat in a covered crucible. When cold dissolve in water, filter, evaporate, and crystallize. *Prop.* Decomposed by exposure in solution to the air. *Use.* To form baryta and its salts and in organic analysis.

BARK, BRITISH. *Syn.* Oak Bark. The bark of the young branches of the oak has been proposed for the more expensive productions of South America. The leaves also contain a large quantity of astringent matter. Mr. Stuart, who first brought oak bark into notice, says that it is a certain remedy for scurvy.

BARLEY. *Qual.* Next to wheat, barley may be considered the most valuable grain to man, both for the purposes of food and for forming several beverages in general consumption. (Malt liquors, &c.) It forms good wholesome bread, especially for persons who otherwise live luxuriously, but for those who live abstemiously wheaten bread is preferable.

BARLEY, CULTIVATION OF. After wheat, barley may be considered the most important grain crop, especially in light and sharp soils, but it "is a tender grain, and easily hurt in any of the stages of its growth, particularly at seed-time; a heavy shower of rain will then almost ruin a crop on the best-prepared land; and in all the after-processes, greater pains and attention are required to ensure success than in the case of other grains. The harvest process is difficult, and often attended with danger; even the thrashing of it is not easily executed with machines, because the awn generally adheres to the grain, and renders separation from the straw a troublesome task. Barley, in fact, is raised at a greater expense than wheat, and generally speaking is a more hazardous crop. Except upon rich and genial soils, where climate will allow wheat to be perfectly reared, it ought not to be cultivated.

"Barley may be divided into two sorts, early and late; to which may be added a bastard variety, called bear or bigg, which affords similar nutriment or substance, though of inferior quality. Early barley, under various names, was formerly sown in Britain, upon lands that had been previously summer fallowed, or were in high condition; but this mode of culture being in a great measure renounced, the common sort, which admits of being sown either early or late, is now generally used.

"The most proper seed-season is any time in April, though we have seen good crops produced, the seed of which was sown at a much later period."

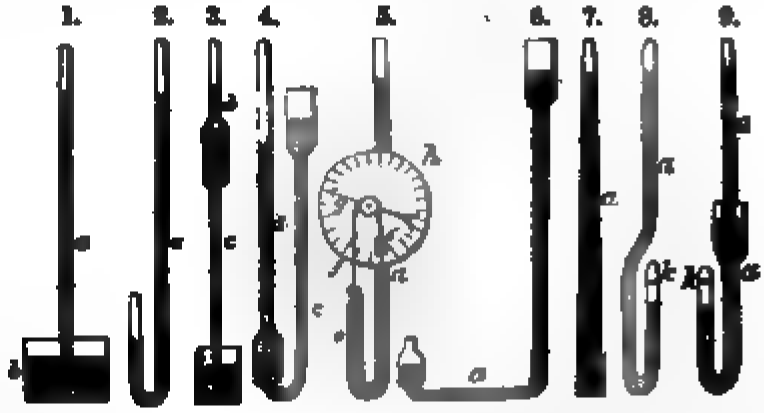
Barley is generally sown after turnips and frequently after peas and beans, but seldom after wheat or oats. The quantity of seed varies with the quality of the soil. Upon very rich land eight pecks per acre are commonly sown, and frequently ten or twelve, whilst upon poor lands a larger quantity is sometimes given. Enough seed should be sown to ensure a full crop without offsets, which are always produced if too little seed is used.

The harvesting of barley requires much care even in good seasons, while, in bad ones, it is very difficult to save it. It must be cut before the straw gets brittle, and must be suffered to remain in the field until the grain is hardened, and the straw sufficiently dry. If stacked too soon it is apt to heat. A good way to prevent this is to form an opening through the stack from top to bottom. This opening is generally made by placing a large bundle of straw in the centre of the stack, when the building commences, and, in proportion as it rises, the straw is drawn upward, leaving a hollow behind, which, if one or two openings are left in the side of the stack near the bottom, ensures so complete a circulation of air as not only to prevent heating, but to preserve the grain from becoming musty.

BARNS AND OUTHOUSES FROM MITES AND WEEVILS, TO FREE. (*German method.*) Let the walls and rafters, above and below, of such granaries be covered completely

with quicklime, slaked in water, in which trefoil, wormwood, and hyssop, or nux vomica have been boiled. This composition should be applied as hot as possible. "A farmer who had his granaries empty in June last, collected quantities of the largest sized ants in sacks, and scattered them about the place infested with weevils. The ants immediately fell upon and devoured them all."

BAROMETER. (From βαρος weight and μετρον, measure.) An instrument for measuring the weight and pressure of the atmosphere, commonly termed a weather-glass. This instrument is made of various shapes, but the principle of its construction is the same in each, and consists of a column of mercury, supported in vacuo, in a glass tube, by the pressure of the atmosphere on its surface. The following engravings represent the principal varieties. The several shapes have arisen from the attempts which have been made from time to time to improve this instrument, either by increasing its range or portability. None, however, equal the old forms proposed by Torricelli, and represented by the figures 1 and 2. The same letters apply to a similar portion of each figure; the references at foot will therefore sufficiently explain the peculiarities of their construction.



1. Torricelli's cistern barometer.
2. ———— syphon ditto.
3. Huygen's barometer.
4. ———— modified.
5. Wheel barometer.
6. Bernouilli's syphon ditto.
7. Amiston's conical ditto.
8. Gay Lussac's ditto.
9. Ditto, modified by M. Bunten

a, Tube containing a column of mercury.
b, Mercurial cistern.
c, A column of mercury supporting another of water, d.
e e, Weights, one of which floats on the surface of the mercury, and by means of the cord f moves the index g.
h, Graduated dial.
k, Capillary hole drilled laterally to admit air.

The wheel barometer (fig. 5) is the one most commonly used, especially as a weather-glass, but it is not to be depended on, as it neither indicates the absolute height of the mercurial column, nor its variations with sufficient accuracy for any philosophical purpose. Even as a weather-glass it is the worst of all the common forms of the barometer. For travelling the last is perhaps the most unexceptionable.

The Construction of a Barometer may be divided into five operations, in each of which the utmost skill and care are required. The materials must be of the *best quality*. Not only must the mercury be perfectly pure and free from air, but the tube must be quite dry and clean, and its inner surface must be smooth and regular.

1. *The tubes* for barometers should be hermetically sealed immediately after their manufacture at the glasshouse, and kept in this state until they are wanted for filling. By this plan they may be kept clean for any length of time, whereas if they are left with one end open they become sullied with dust and smoke, which, on account of the smallness of their diameters, can never be perfectly removed. When wanted for use they may be opened with a file, after which care must be taken not to breathe into them, and washing them out with spirit of wine, &c., especially avoided. When cleaning is absolutely necessary, it should be done by means of a clean, dry linen rag, and a piece of wire, observing not to let the end of the wire scratch the glass, as, if it does, such tubes will generally be found broken, if laid aside for a short time, or, what is worse, they will break during the process of filling them. The best tubes are perfectly cylindrical, 33 inches in length, and the diameter of their bore never less than 2 to 2½ lines, as the capillary attraction and friction increases in an inverse ratio to the capacity of the tube. The thickness of the glass should not greatly exceed half a line.

2. *The mercury* must be perfectly pure, which should be ascertained before using it, as, if it be adulterated with common metals, as is frequently the case, its fluidity is lessened, and its tendency to oxidize increased. When it cannot be got unadulterated it should be rectified in an iron retort; or pure cinnabar, mixed with half its weight of iron filings, may be treated in the same way, when pure mercury will distil over. (See Mercury.)

3. *Filling the tube* is performed by pouring the mercury into it, having previously boiled it in a porcelain or iron vessel, to expel the air. The tube is then exposed to a gradually increasing heat over a chafing-dish of charcoal until the mercury boils, and all the air in the tube is extricated; it is now allowed to cool and again filled up with mercury, and the exposure over the chafing-dish repeated; when again perfectly cool it may be filled up with a little freshly-boiled mercury, and is then ready for fixing in its frame.

4. *The tube filled as above must next be placed in its frame*, for which purpose the open end is perfectly stopped, and it is inverted into a small trough of prepared mercury; or if it be of the syphon kind, simply inverted and fixed in its frame.

5. *The graduated scale* has now to be adjusted to the tube. This is usually done by means of a tangent screw, which permits the scale to be raised or lowered, until its zero exactly corresponds to the lower surface of the mercury; but in many cases

the cistern is raised or lowered by means of screws arranged for that purpose. The best mode of obtaining an exact adjustment of the surface of the mercury to the zero of the tube, is that adopted by the celebrated French artist, Fortin. An ivory needle is attached to the scale pointing downwards, its point being exactly on a level with the zero of the scale. The image of the needle is clearly reflected from the surface of the mercury in the cistern, and either the scale or cistern is raised or lowered, until the point of the needle and its image exactly coincide.

Use. This instrument is employed for ascertaining the amount of atmospherical refraction in astronomical calculations, in measuring altitudes and in prognosticating the weather. For the latter purpose, on land, it frequently proves a false prophet, but at sea, (according to Dr. Arnot,) the case is widely different, and its monitions are worthy of attention. (Elem. Nat. Phil. i. 353.)

Remarks. The above is a brief outline of the method of constructing barometers, and in proportion to the skill therein exercised will be the accuracy of the instrument. However cleverly this may have been performed, it is nevertheless found that these instruments gradually suffer deterioration from the external air insinuating itself between the mercury and the glass tube, thus lessening the perfection of the vacuum. Various plans have been proposed to remedy this inconvenience and source of error. Professor Daniels lines the bottom of the tube with platinum to the extent of about ½ of an inch; this has proved quite sufficient. Dr. Ure uses platinum foil for the same purpose. It is usual, as I have above described, to boil the metal after its introduction into the glass tube, but some persons disapprove of this practice in consequence of the mercury absorbing a little oxygen during the process, and instead thereof, they strongly heat the glass tube and pour in the mercury very hot.

BAROMETER, PORTABLE, (SIMPLE.) This instrument consists in general of a tube of the usual length, passing through the upper parts of a wooden cistern, to which it is glued, and the bottom of which is made of leather. The tube being filled with mercury, which has been previously well purged of air, and placed in a proper position, the superfluous mercury descends into the cistern, and assumes a level in the tube corresponding with the weight of the external air. The surface of the mercury in the cistern is adjusted to the same level by a screw, which presses more or less against the flexible leather at the bottom, and raises or depresses it at pleasure. From the line of this level, which is called zero, the scale commences, and is reckoned upwards to the height of about 32 inches; the actual divisions of the scale begin at about 15 inches.

Remarks. The most accurate portable barometers are those of Gay Lussac and Bunten, (Figures 8, 9.) When set on universal joints and well balanced, they are the most perfect instruments for ships that have been yet constructed.

BAROMETER, TROUGHTON'S MARINE. The tube of this instrument consists of two parts, joined together about 5 inches below the top; the bore in the upper part being about $\frac{4}{10}$ of an inch, and in the lower part only $\frac{2}{100}$. By this construction, partly from the difference of the bores, and partly from the greater friction in the lower end, the motion of the mercury is so much retarded, that any impulse given by the ship, having a tendency to raise it, will scarcely have produced a sensible effect, before an opposite impulse will be given, having a tendency to depress it. To counteract more effectually the effects of the ship's motions, the instrument is suspended in gimbals.

BAROMETER, THE VIAL. *Prep.* Take a common vial and cut off the rim and part of the neck, by means of a piece of cord passed round it, and moved rapidly to and fro, in a sawing direction; the one end being held in the left hand and the other fastened to any convenient object, while the right hand holds and moves the vial; when heated, dip it suddenly into cold water, and the part will crack off; or separate it with a file. Then nearly fill the vial with clean water, place your finger on the mouth and invert it; withdraw your finger and suspend it in this position with a piece of twine. In dry weather the under surface of the water will be level with the neck of the bottle, or even concave; in damp weather, on the contrary, a drop will appear at the mouth and continue until it falls, and is then followed by another in the same way.

Barometrical corrections. Cistern barometers formed of tubes of very small diameters, require what is called "correction for capillarity."

The following Table is taken from the "Encyclopædia Britannica."

Diam. of Tube.	Depression.
Inches.	Inches
0·10	0·1403
0·15	0·0863
0·20	0·0581
0·25	0·0407
0·30	0·0292
0·35	0·0211
0·40	0·0153
0·45	0·0112
0·50	0·0083
0·60	0·0044
0·70	0·0023
0·80	0·0012

Remarks. It will be seen, that as the tube increases in diameter, so the depression of the mercury lessens. Syphon barometers that have each of their legs of equal size, require no correction, as the depression is equal at both ends. A correction is also made for temperature in nice observations, but this is of too scientific a nature to be entered into in the present work.

BAROMETRICAL RULES FOR PROGNOSTICATING THE WEATHER.

1. After a continuance of dry weather, if the barometer begins to fall slowly and steadily, rain will certainly ensue; but if the fine weather has been of long duration, the mercury may fall for 2 or 3 days, before any perceptible change takes place, and the longer time that elapses before rain comes, the longer the wet weather is likely to last.

2. Conversely, if, after a great deal of wet weather, with the barometer below its mean

height, the mercury begins to rise steadily and slowly, fine weather will come, though 2 or 3 wet days may first elapse; and the fine weather will be the more permanent, in proportion to the length of time that passes before the perceptible change takes place.

3 On either of the two foregoing suppositions, if the change immediately ensues on the motion of the mercury, the change will not be permanent.

4. If the barometer rises slowly and steadily for two days together, or more, fine weather will come, though for those two days it may rain incessantly, and the reverse; but if the barometer rises for two days or more during rain, and then, on the appearance of fine weather, begins to fall again, the fine weather will be very transient, and *vice versa*.

5. A sudden fall of the barometer in spring or autumn indicates wind; in summer, during very hot weather, a thunder-storm may be expected; in winter a sudden fall after frost of some continuance, indicates a change of wind with thaw and rain; but in a continued frost a rise of the mercury indicates approaching snow.

6. No rapid fluctuations of the barometer are to be interpreted as indicating either dry or wet weather of any continuance; it is only the slow, steady, and continued rise or fall, that is to be attended to in this respect.

7. A rise of the mercury late in the autumn, after a long continuance of wet and windy weather, generally indicates a change of wind to the northern quarters, and the approach of frost.

BARYTA. *Syn.* PROTOXIDE OF BARIUM. OXIDE OF DITTO. (See BARIUM.)

BARYTA, SALTS OF. *Prep.* All the soluble salts of baryta may be made by solution of its carbonate or hydrate in the dilute acids, and the insoluble salts, generally, by the double decomposition of its muriate, by a soluble salt of the acid.

BARYTA, TESTS FOR, AND ITS SALTS. I. This earth forms an alkaline solution with water. II. Baryta in solution, and all its salts, give a white precipitate in alkaline carbonates and sulphates, and sulphuric acid; the last two being insoluble in both acid and alkaline menstrua.

BARYTA, ALLOXANATE OF. *Prep.* Add barytic water to an aqueous solution of alloxan, heated to 140°, until the precipitate formed, ceases to be redissolved on stirring; then cool and collect the crystals, and repeat the process of adding barytic water to the mother liquor, which will thus furnish several crops of crystals. *Use.* To form some salts.

BARYTIN. A new vegetable base discovered by Simon, in the rhizomes of white hellebore. It is precipitated from its solutions by sulphuric acid and the sulphates, like baryta, hence the name; and this property affords a means for its separation.

BASE, (IN CHEMISTRY.) A term applied to metallic oxides, (from their forming salts with acids,) and to the principal constituent of a compound. Thus: *soda* is called the base of *sulphate of soda*, (glauber salts;) *quinine* the base of *disulphate of quinine*, *&c.* Forms will be found in this book for the preparation of the principal bases, as well as their salts.

BASILICON, BLACK. *Prep.* Yellow wax 1 lb.; black rosin and olive oil, of each 2 lbs. *Proc.* Melt together and strain through a piece of canvass. *Remarks.* This old preparation is similar to the resin cerate of the London Pharm., with the exception of containing *black* instead of *yellow* rosin. Linseed oil, used instead of olive oil, comes cheaper, and is preferred by many persons.

BASSORIN. *Syn.* INSOLUBLE GUM. The insoluble portion of gum tragacanth, &c., after the soluble part has been removed with water. *Prep.* It is best prepared by soaking gum bassora in a large quantity of hot water, and filtering off the clear portion.

BATEMAN'S PECTORAL DROPS. *Prep.* Paregoric 10 oz.; tincture of castor 4 oz.; laudanum 1 oz.; tincture of saffron or cochineal ½ oz.; oil of aniseed 15 drops. Mix. *Dose.* A teaspoonful or more in coughs and colds.

BATEMAN'S ITCH OINTMENT. *Prep.* Carbonate of potassa 1 oz.; red sulphuret of mercury ½ oz.; hog's lard and flowers of sulphur, of each 22 oz.; bergamotte 60 drops; rose-water 2 oz. *Proc.* Mix the potassa and powders with a little of the lard, and rub them well together, then add the remainder of the lard, previously softened by heat, and afterwards the rose-water gently warmed; stir until cold.

BATHS, BATHING. *General Remarks.* The practice of bathing is not only an act of cleanliness, but is eminently conducive to health. The delicate pores of the skin soon become choked by the solid matter of the perspiration and the accumulation of dirt, and require frequent ablution with water, to preserve their natural functions in a state of activity. The mere wearing of flannel and washing the more exposed parts of the body, and the daily use of clean linen, is but an imperfect attempt at cleanliness, without being accompanied by entire submersion of the body in water. The phlegmatic Englishman, unlike his lively French neighbor, seems perfectly incredulous on this point, and would sooner spend his sixpence or his shilling in a glass of grog, or a ride to Greenwich, than in the healthy recreation of the bath.

Bathing is not only conducive to cleanliness, but to both the physical and mental health. The body cannot be in a state of *lively health*, while the proper offices of the skin are interfered with, any more than would be the case with either of the other excretory organs, placed in a like condition. Nor can the mind, dependent as it is on the organization of the body, escape unharmed, when the animal functions are imperfectly performed. Intellectual and moral vigor are universally promoted by the imperceptible yet controlling influence of the physical system, and he who would increase the former, cannot go on a safer method than that which tends to preserve or improve the health.

"On the continent, '*Maisons des Bains*,' or bathing-houses, are almost as numerous as the chemists and druggists are in this country. The inference necessarily is, that bathing in France is as much patronized as physic is in England. The French need the latter less, because they live more temperately, are less ground down to think and work; and because they perform general personal ablution (to the benefit of one of the most important functions of life, namely, free perspiration) with as much zeal as though it were a re-

ligious duty. The inducement to such frequent use of the warm bath among our neighbors, may be fancied to be the low charges for bathing, and the little value the *Messieurs* attach to their own time. The first notion is a fallacy. Warm bathing on the continent is not cheaper in comparison with all the other necessaries or luxuries of life, viewed in connection with a foreigner's resources, than it is in England. With regard to the apparently little importance they attach to their own time, they are wise enough to discover, that life is not one jot sweeter by passing sixteen hours a day behind the desk or counter, to the exclusion of all recreation, except recreation be to count the gains of such exilement; or to indulge the hope of amassing a sufficiency to do the '*important*' at the close of a wearied life, when and which the infirmities of age forbid to enjoy. *A Frenchman lives, works, and enjoys himself to the last. Prince Talleyrand died in armor; his life was a bouquet in which all but the sweetest flowers were excluded.* A Frenchman takes the bath for the mental and bodily gratification it affords; he can appreciate the luxury of it, while at the same time he is sensible of its healthfulness. An Englishman is such a stiffnecked fellow, that in most things, he will only do that which pleases him best, and his standard of pleasure is estimated by that which adds most to his hoard, and which gives the greatest amount of satisfaction to the inward man. Advise him to take a warm bath; the answer is, he cannot spare the time, and he hates the bother of uncravating, &c. The waste of the one and the trouble of the other add not to his income, whatever they may to his health. The roast beef, the brandied wines, and the London-brewed are his stomach's deities, the minor godships being blue pills and black draughts. The latter are indispensable attendants upon the former, to temper down Mr. Bull, lest he become a giant in noses and carbuncles. *A Frenchman knows no ill but what pleasure denies; he rarely has dyspepsia, gout, rheumatism, or fevers. Half his life is spent in Elysium,—half ours in* PURGATORY. Indigestion, headaches, restless nights—the *blues* when awake, and the *terribles* when asleep—fall to the lot of the mind-absorbed and grossly-fed Londoner, while our lively Parisian, with his light meal and still more lightsome body, finds trouble only in broken limbs, or positive starvation."

The warm bath, especially, is one of the most valuable, but most neglected remedies which we possess. It is generally imagined by Englishmen, that bathing is but little fitted for their country, owing to the changefulness of the climate, and that to attempt to place a sick man in a bath in any other than the mildest weather, would be to subject him to all the horrors of "*sniffling, sneezing, coughing, and relapse.*" But that such results of bathing have no existence beyond the minds of the fearful, ignorant, and prejudiced, must be acknowledged by every candid person. Even the cold bath, as in the treatment termed "hydropathy," is beneficial when applied with judgment; and it is only when common discretion is not exercised, that bathing under any shape ever proves injurious.

Some persons are very susceptible of taking cold, and are themselves "*living barometers;*" but even to them warm bathing would prove advantageous. One half of the rheumatic twinges, swollen limbs, and cramped joints that occur in such persons, would give way before proper perseverance and confidence in this remedy.

Whenever in delicate persons the cold bath is deemed proper, the warm, tepid, and cool bath may be used as a preparative, and when the former is at length adopted, it should be at first only for one or two minutes at a time, gradually increased to a quarter of an hour or twenty minutes; care being taken never to remain immersed sufficiently long to induce a sensation of cold on coming out. A healthy reaction should follow the bath, and a pleasing glow of warmth should diffuse itself over the surface of the body. If this be not the case, the bath has either been indulged in too long, or been injudiciously taken. When any symptoms appear that contra-indicate the use of the cold bath, the tepid, warm, or vapor bath may be substituted, according to circumstances.

In conclusion, I may remark, that bathing, *especially in water at a temperature nearly similar to that of our bodies*, (tepid bath,) is at once one of the most cleanly and health-preserving luxuries, or, I should say, necessaries of life. The following short notice of each description of bath, is all the space that can be spared for this subject.

I. *Affusion of cold water* over the surface of the body, has been adopted with success, for arresting the progress of some fevers. In scarlatina, &c., sponging the body with tepid water, or water mixed with vinegar, has been employed instead.

II. *Air bath. a.* (*Cold.*) The mere exposure of the body in a state of nudity to the atmosphere, forms the common air bath. It has been found useful in allaying slight degrees of febrile excitement, and to act as a mild tonic, when not too long continued.

b. (*Hot.*) This consists in placing the patient in an apartment to which heated air is admitted. It is generally considered to be more stimulant than the vapor bath; it produces a powerful perspiration, and has been recommended in cholera, congestive fevers, rheumatism, scaly skin-diseases, &c.

III. *Chlorine bath.* Water holding in solution a small quantity of chlorine gas. Its action has not been much examined. I may mention here, that I have seen several cases of itch cured by two or three immersions in a warm bath, to which a little chloride of lime has been added.

IV. *Cold bath.* The temperature of this bath varies from 45° to 85°. It is considered tonic and stimulant, when not too long continued. To produce its full effects, the patient should feel a pleasant glow upon the surface of the body, immediately on coming out of the water. If a sensation of coldness or shivering follows, it should not be repeated. The duration of the immersion may vary from two minutes to a quarter of an hour, depending upon the temperature of the water, and the feelings of the bather; the latter period not being too long, *provided* swimming or violent exercise be adopted in the bath. The temperature of the water of the rivers, and on the coast of England, varies in summer from 55° to 70°.

The following hints on cold bathing may be interesting to the reader.

1. "In using the cold bath, it is of essential importance to know that there is no truth in the vulgar opinion, that it is safer to enter the water when the body is cool, and that persons heated by exercise, and beginning to perspire, should wait till they are *perfectly cooled*.

"It is a rule liable to no exception, that moderate exercise ought always to precede cold bathing; for neither *previous rest*, nor *exercise to a violent degree*, is proper on this occasion.

2. "The duration of cold bathing ought to be short, and must be determined by the bodily constitution and sensation of the individual; for healthy persons may continue in it much longer than valetudinarians. In summer it may be enjoyed for an hour, when in spring or autumn, one or two minutes will be sufficient. Under similar circumstances, cold water acts on aged and lean persons with more violence than on the young and corpulent; hence the former, even in the hottest days of summer, can seldom with safety remain in the bath longer than a quarter of an hour; while the latter are generally able to sustain its impressions for a much longer period.

3. "The head should first come in contact with the water, either by immersion, by being showered upon, or by covering it for a minute with a wet cloth, and then plunging head foremost into the water.

4. "As the immersion will be less felt when it is effected suddenly, and as it is of consequence that the first impression should be uniform over the body, the bath ought *not* to be entered slowly or timorously, but with a degree of boldness. A contrary method, in some constitutions, is dangerous, as it propels the blood from the upper to the lower parts of the body, and thus predisposes to a fit of apoplexy. For these reasons, the *shower* bath is attended with considerable advantages, because it transmits the water quickly over the whole body.

5. "The morning is the proper time for using the cold bath, unless it be in a river; in which case the afternoon, or from one to two hours before sunset, will be more eligible. On the whole, one hour after a light breakfast, or two hours before, or four after dinner, are the best periods of the day for this purpose.

6. "While the bather is in the water, he should not remain inactive, but apply brisk and general friction, and move his arms and legs, to promote the circulation of the fluids from the heart to the extremities. It is extremely imprudent to continue in the water till a second chilliness attacks the body.

7. "Immediately after leaving the bath, it is necessary that the bather should quickly wipe his body dry with a coarse dry cloth. He should not afterwards sit inactive, but if the season permit, he ought to take gentle exercise, till the usual circulation, and the customary action of the muscles, be restored.

8. "The best place for cold bathing is in the sea, or a clear river; but where neither of these can be conveniently had, the shower bath may be used.

9. "The principal advantages to be expected from cold bathing, besides the salutary exercise, are either the reduction of excessive heat, or the producing of a salutary reaction of the system. In the former, it has been found useful in several fevers. *Affusion*, however, in those cases, is most advisable, and more efficacious in reducing the morbid temperature, than immersion. But the cold affusion must not be employed in the cold stage. As soon as the hot fit is formed, the cold affusion is to be used immediately, and repeated occasionally. In the sweating stage, it is to be cautiously avoided.

"In nervous diseases, too, the cold bath has sometimes been of service.

"In gouty and rheumatic complaints, in diseases of the hip-joint, lumbago, or sciatica, after the removal of those complaints by the use of the vapor or hot bath, and in conjunction with other remedies, the alternation of the cold with the vapor bath fortifies the constitution against a return of such attacks.

10. "The best preparation for cold bathing, is to begin with a warm, then a tepid, and afterwards a cool bath; after this course the bather may in general plunge with safety into the cold bath. In most cases, a bath every second day, from the commencement of the warm bathing to the end of a fortnight, will be sufficiently frequent; afterwards the cold immersion may be continued daily."

V. *The douche* consists in the projection of a stream of cold water from a tube upon any part of the body. It is powerfully sedative, and has been long employed in inflammation of the brain. It should be used with caution, as its action is so powerful that a full inflammatory pulse frequently sinks into one almost imperceptible, in a very short space of time. It is one of the principal methods of applying cold water adopted by the hydropathists.

VI. *Medicated baths.* These consist of water holding in solution various medicinal substances; as wine-baths, milk-baths, soup-baths—these have been used to convey nourishment to the body; sulphureous baths, mercurial baths, &c., used in skin diseases, syphilis, &c.; aromatic and chalybeate baths, employed as tonics; acid baths, sometimes used to remove the effects of mercury, &c.

VII. *Nitromuriatic bath. Prep.* Mix 3 fluid ounces of muriatic acid with 2 fluid ounces of nitric acid, and 5 fluid ounces of distilled water, and add 3 ounces of the above mixture to every gallon of water in the bath. Should the bath prick the skin, a little more water may be added.

Remarks. This bath was first introduced as a remedy for liver complaints. It must be contained in a wooden vessel, and may be used as a hip, knee, or foot-bath, a knee-bath being the one generally adopted in England. The inventor, Dr. Scott, once plunged the Duke of Wellington up to his chin in a bath of this kind in India, and thus cured him of a severe hepatic affection.

VIII. *Sulphur bath. a.* The patient is placed (not including the head) in a species of box, at the bottom of which is put a piece of hot iron, on which a little sulphur is thrown, great care being taken to avoid the escape of the fumes, and the inhalation of the same by either the patient or the attendants. Another method is to dissolve a little sulphuret of potassium in the water of a common warm bath. The proportion is 1 oz. of the sul

phuret to 8 gallons of water. This form of the bath is not, however, quite as efficient as the gaseous one first described.

b. (*Dupuytren's gelatino-sulphurous bath.*) This is formed by dissolving 1 oz. of the sulphuret of potassium and 4 oz. of Flanders glue, in every 8 gallons of the water of a warm bath. It is an imitation of the celebrated waters of Barèges, the glue supplying the place of the barégine found in the latter.

Remarks. The sulphur-bath under any form is a powerful remedy in every description of skin disease. Leprosy, the most obstinate of all, has been cured by it. The common itch requires only one or two applications of the sulphur-bath to eradicate it entirely. All forms of scurf, whether on the face, head, or body, yield to its influence. Local irritation occasioned by minute pimples, or inflammatory patches of disordered skin, is speedily subdued and removed. Scrofula, and also those affections for which the warm or vapor baths have been recommended, will derive powerful assistance from the sulphur-bath.

IX. *Tepid bath.* The temperature of this bath varies from 85° to 92° Fahr., 88° being considered a medium temperature. Its action on the body is intermediate between that of the warm and cold baths, and is admirably adapted for the purposes of cleanliness, and promoting the healthy action of the skin. It is frequently employed as a preparative to cold bathing.

X. *The warm bath* has a temperature of from 92° to 100° Fahr., or about that of the human body.

Remarks. The warm bath is at once the most luxurious and effective mode of bathing, and if taken under proper restrictions, is highly conducive to health. If only on the grounds of personal cleanliness, this species of bathing has the highest claim on our attention. "The sensations attendant upon immersion in a warm bath are most delicious. Its effect is, first to increase the circulation of the blood, and to determine it to the skin; after a few minutes an agreeable and universal increase of heat is experienced; the face, and forehead generally, are soon bedewed with perspiration: a pleasing and prevailing calm is felt, mentally and physically; and after remaining in some 12 or 15 minutes, coming out and dressing, the refreshing feeling and consciousness of personal purity give rise to associations of the most happy character. The warm bath may be taken at any time during the day: it is perhaps better to employ it upon an empty stomach, or before a meal, rather than after one. The temperature should be from 98° to 100°; the time of immersion should not exceed 15 minutes. The old idea that it is relaxing, is erroneous, except where persons remain in for hours, as some people do, or where it is taken too often."

The warm bath, in a medical point of view, is especially adapted to general torpor of the system, liver and bowel complaints, hypochondriasis, hysterical affections, morbid suppressions, dry skin, nearly all cutaneous and nervous diseases, chronic rheumatism, &c. As a tonic or stimulant after excessive fatigue, great mental excitement, or physical exertion, it is unequalled, and furnishes one of the most wholesome, and at the same time luxurious sources of refreshment we are acquainted with.

XI. *The vapor-bath* consists in vapor being admitted to the apartment, and thus not only is the body immersed in it, but it is inhaled as well. It is used at different temperatures, known by the name of *tepid*, when the temperature varies from 90° to 100°; *warm*, when from 100° to 112°; and hot, from 110° to 130°; but when the vapor is not inhaled, the heat of the latter may be raised to 160°.

Remarks. The principal action of the vapor-bath is to produce a copious diaphoresis. In fact, it is the most powerful diaphoretic agent known. It is a certain specific for a cold; and in all those cases wherein warm bathing is recommended, the vapor-bath ranks highest. It constitutes the most powerful pharmaceutical remedy existent: combined with friction, or shampooing, its utility in cases requiring an additional action, as in contracted muscles, tendons, &c., is much increased; "and instances are numerous, where the lame have thrown aside their crutches, and the bed-ridden have again mixed with the world, after a few applications of this bath." "It is no uncommon thing to hear a patient start and shriek with agony before entering the bath, and to receive his congratulations and thanks on his coming out: they will oftentimes exclaim,—'*It is wonderful! I could not have believed it—I am well—I can walk—I can jump!*'"

The vapor-bath is administered in chronic rheumatism, stiff joints, long-continued indigestion, gout, lumbago, sciatica, scrofulous swellings, fever, skin diseases, &c., but should be avoided in acute inflammations, and for persons of a very full and excitable habit of body.

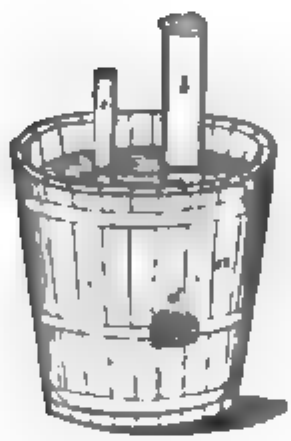
XII. *The shower-bath.* This may be regarded as a modification of the cold bath or plunge bath, and its effects are similar. The cold shower-bath is however less alarming to nervous persons, and less liable to produce cramp, than cold immersion: it may be considered as the best and safest mode of cold bathing, and is recommended in many nervous complaints.

It has also afforded relief in some cases of insanity.

Where the saving of expense is an object, or a regular shower-bath is not to be procured, a large common watering-pot filled with cold water may be used as a substitute. Let the patient sit undressed upon a stool, which may be placed in a large tub, and pour the water from the pot over the head, face, neck, shoulders, and all parts of the body, progressively down to the feet, until the whole has been thoroughly wetted.

BATHS, TO HEAT. Various methods have been proposed for this purpose, but they are for the most part expensive and unsuited to private families. The following plan, however, is an exception to the above, and will be found at once cheap and convenient.

Italian plan of warming baths. This consists in immersing in the bath a sort of U or syphon-shaped sheet iron tube, furnished with a little fire-place, near the bottom, for the purpose of burning charcoal. In the following figure is given a representation of this simple apparatus and its application.



a, Bath tub.
b, The larger arm of the warming-tube by which the charcoal is introduced, and by which the fumes fly off.
c, The smaller arm to admit air to support the combustion.
d, The fire-grate, to support the burning charcoal.

BATHS, THE SITUATION OF. This should always be, if possible, near the principal bedrooms on the same floor, for the sake of ready access to them, and in a place where plenty of good water can be procured.

BATHS, (in Chemistry.) These mostly consist of water or alkaline solutions, in which vessels are placed containing substances that it is desirous to submit to a limited degree of heat. The highest temperature that can be given to any substance contained in a vessel placed in another of boiling water, is about 205 or 206°; but by adding one-fifth of salt to the bath, a heat of 212° may be obtained. Baths of fusible metal, saturated solutions of salt, sand, and (on the large scale) steam, are also used. (See Boiling Point.)

BATH METAL. *Prep.* Melt together, under charcoal, 1 lb. of brass, with 4½ oz. of spelter.

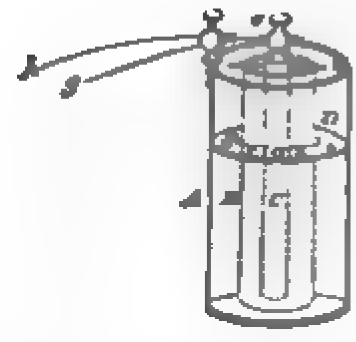
BATH PIPE. *Prep.* Powdered white sugar 1 lb.; Italian juice (dissolved in a little water) 2 oz.; powdered gum arabic 1 oz. *Proc.* Make them into a stiff mass with warm water, and roll it into the usual form.

BATTER, (in Cookery.) A mixture of flour, milk, eggs, oil, or butter, and frequently spices, beat together to a thin paste. *Use.* To cover various articles during the operation of cooking, and also to form puddings.

BATTERY, GALVANIC OR VOLTAIC. An instrument or apparatus for the production of an electrical current by chemical decomposition.

One of the most useful forms of the galvanic battery is that proposed by Professor Daniell, and commonly known by his name. Its peculiar advantages arise from its action continuing without interruption for a long time, hence the name of *constant battery* that has been applied to it. The following figure will explain its construction.

Between the membrane and the copper cylinder is poured a saturated solution of blue vitriol, and in the diaphragm or cylinder *B*, dilute sulphuric acid of the s. g. of 1·136 made with about 1 part of oil of vitriol and 7 or 8 of water. The battery is now ready to be applied to the purposes of electrotyping, for which *one* is quite sufficient; *six* of these simple batteries will form a circle of considerable power, and about 20 will produce one sufficiently strong for most experiments of demonstration and research.



A, A copper cylinder filled with a saturated solution of sulphate of copper.
B, A smaller porous cylinder or membrane, containing a mixture of 1 part of oil of vitriol and 7 of water.
C, A rod of zinc supported in the smaller cylinder by the cross-piece *i*.
D, A shelf full of small holes, for supporting crystals of sulphate of copper, to keep up the strength of the solution.
e and *f*, Screws and caps to connect the wires *g* and with the battery.
g, The positive wire.
h, The negative wire.

II *Another permanent battery* of considerable power is formed by arranging a series of cells, 2 inches in diameter, in each of which is placed a smaller cell, of 1 inch in diameter. The latter are filled with a solution of sulphuret of potassium, of the sp. gr. 1·14, and the former with nitric acid, of the sp. gr. 1·35, the pairs are then connected together with small discs of platinum foil.

III. *Professor Jacobi* has lately described a very *simple*, *cheap*, and *convenient* form of battery said to be discovered by a Russian prince, but which is, in reality, only an adaptation on the small scale, of the terraqueous battery of Mr. Bain, by which he works his telegraph. This new battery is formed by immersing a plate of zinc and another of copper, in common garden mould, placed in a flower-pot, when, on completing the circuit, a powerful current of electricity is produced. All that is necessary to keep up the action of the battery is to moisten the earth with a little water. The plates should be placed equidistant from each other, and the sides of the pot. The professor has had a battery of twenty of them at work for a month without their activity being apparently diminished.

BEANS. *Qual.* A wholesome esculent, when eaten in the green state, and well cooked, but apt to produce flatulence unless combined with spices. In the dried or ripe state they are more difficult of digestion, and are apt to distend the stomach. Beans are mostly cooked by boiling in water, to which a little salt of tartar has been added, to preserve their green color.

BEANS, CULTIVATION OF. Beans should succeed a grain crop, provided the ground is in decent order, and not worn out by previous working. Less than *four* bushels of seed ought not to be used per acre, and this is best sown by running the drill-barrow after every third plough; afterwards harrowing before the young plants reach the surface.

Dung is frequently given to beans, especially when they succeed wheat, that had not received manure. It is best applied on the stubble, before the winter ploughing is given, or it may be thrown into the drills with the seed. Beans require hoeing or earthing up, which is sometimes done by hand or plough; they also require weeding, which must

be done by hand, after the hoeing. Before beans are cut they should be well ripened, and may be generally harvested at the end of September or beginning of October. They should be cut with the sickle and tied in sheaves, and in stacking them a "*bole*," or air funnel, should be left in the centre of the stack, in such a manner that a current of air may pervade the whole. (See BARLEY.)

BEAR'S GREASE. This fat is much esteemed for promoting the growth of the hair, but in reality possesses no superiority over any other animal fat. The mass of that which is sold in England is hog's lard. The quantity annually consumed in Great Britain and exported, is estimated at several tons, being a larger quantity than all the bears at present procurable in Europe would supply, if slaughtered and roasted for their fat.

BEAR'S GREASE. (FACTITIOUS.) *Prep.* Hog's lard 16 oz.; flowers of benzoin and palm oil, of each ½ oz. *Proc.* Melt together until combined, and stir until cold. *Remarks.* This article does not readily become rancid by age, and may be scented at pleasure.

BECHAMEL, (IN COOKERY.) A variety of fine white broth, or consommée, thickened with cream. *Proc.* Cut lean veal and ham or bacon into small slices, put them into a stewpan with a good piece of butter, an onion, a blade of mace, a few mushroom-buttons, a bit of thyme, and a bay-leaf; fry the whole over a very slow fire, but not to brown it; thicken it with flour. Add an equal quantity of good veal or mutton broth, and cream. Let it boil gently one hour, stirring it all the time. Strain it through a soup-strainer.

BEECHWOOD MAHOGANY. *Prep.* Dissolve 2 oz. of dragon's blood and 1 oz. of aloes in 1 quart of rectified spirit of wine, and apply it to the surface of the wood previously well polished.

II. Wash over the surface of the wood with aquafortis, and when thoroughly dry give it a coat of the above varnish.

III. Boil 1 lb. of logwood chips in 2 quarts of water, and add 2 handfuls of walnut peels; boil again, then strain, and add 1 pint of good vinegar, as above.

BEEF. *Qual.* The flesh of a bullock, not past the middle age, is very nutritious, and especially adapted to persons of good appetite, or that labor, or take much exercise. It is also well suited for persons of delicate constitutions, if not overcooked, and left full of gravy, in which case it will sit lightly on the stomach, and its fat prove almost as digestible as that of veal.

Choice. Ox beef is considered the best, and may be known by having a fine smooth open grain, a good red color, and a tender texture. The fat should look whitish yellow, or but slightly yellow. Cow beef has a closer grain than ox beef, and the lean a deeper red; bull beef is closer still, the fat hard and skinny, the lean of a deep red, and it has a stronger smell. Heifer beef resembles ox beef, except in being smaller, for which reason it is preferred in some families. The best roasting pieces are the sirloin and the long ribs, but the short ribs and the silver side of the round are also sometimes roasted, but do not turn out so well. These pieces are much improved by being steeped for three or four hours in a marinade made with three parts of water and one of vinegar, before roasting.

BEEF A-LA-MODE. *Prep.* I. "Cut out the bone from the beef, and convert it, with the trimmings, into gravy; then stuff the orifice with rich forcemeat. Half roast it, and before it is put into the stewpan, lard the top with dried and pickled mushrooms, adding mushroom-powder in the orifices; then put in two quarts of gravy from the bones, a large onion stuck with cloves, and two carrots cut in slices. When the beef has stewed till it is quite tender, strain and thicken the sauce, add to it a glass of wine, mushrooms, and oysters, and sippets of fried paste: either the mushrooms or oysters may be omitted, if the flavor of either should not be desirable."

II. "Take 3 lbs. of the rump, or any part of the beef which will stew well; trim it nicely, and cut off all the fat. Chop all sorts of sweet herbs together very finely, with a little shalot, and a great deal of spice, and put them into a saucer of vinegar, that has been rubbed with garlic. Cut fat bacon into long slips and dip it into the herbs and vinegar; lard the beef regularly on both sides, if necessary, in order that it should be thoroughly flavored; rub the beef over with the herbs and spice; flour the meat, add a piece of butter, the size of a walnut, rolled in flour, and a pint of water. Bake the beef in an oven, strain the gravy, which will scarcely require either thickening or browning, and serve it up with pickles on the top. It is most excellent when cold, but should be served up hot at first. The gravy may be boiled to a glaze if necessary. It will require a good deal of spice; a teaspoonful of cayenne pepper, one of white pepper, a saltspoonful of allspice, half the quantity of pounded cloves, and a blade of mace pounded, or the mixed spices may be used."

BEEF, COLLARED. "Take the best part of a shin of beef, of which soup has been made, (for it must be stewed until very tender,) and an ox-tail, also well-stewed; cut them into small pieces, season them well, add a glass of wine and a glass of ketchup, and put it into a stewpan covered with a part of the liquor in which the ox-tail has been boiled; stew it for about twenty minutes, and then put it into a mould. It must be very cold before it is turned out. This is a good way of employing the beef and heel when soup or jelly is made; a few chopped sweet herbs may be added, and hard eggs cut into slices, or pickles, such as sliced cucumbers, intermingled. The flavor may be varied in many ways."

BEEF, DUTCH. *Prep.* Cover lean beef with a mixture of treacle and moist sugar, for three days, then salt it well with common salt and saltpetre, rubbed well in, and turn it well every day for a fortnight. It must then be rolled tight in a coarse cloth, and submitted to heavy pressure, after which it is to be hung up in wood smoke, and turned every day. If after boiling it be well pressed it will grate or cut in "shivers" equal to the finest Dutch beef. One pound of salt is enough for twelve pounds of beef.

BEEF, HAMBURGH. *Prep.* This is prepared by pickling the beef for three weeks, with a mixture of 1½ lb. of salt, 1 lb. of treacle, and 1½ oz. of saltpetre, well rubbed in, after which it is dried in wood smoke. The ribs is the part generally

used, of which the above pickle will be enough for 15 to 18 lbs.

BEEF, HUNG. *Prep.* I. Choose a piece of beef with as little bone as you can, (the flank is best,) sprinkle it, and let it drain a day; then rub it with salt and saltpetre, but only a small proportion of the latter; and you may add a few grains of cochineal; all in fine powder. Rub the pickle every day into the meat for a week, then only turn it.

It will be excellent in eight days. In sixteen drain it from the pickle; and let it be smoked at the oven's mouth when heated with wood, or send it to the baker's. A few days will smoke it.

A little of the coarsest sugar may be added to the salt.

It eats well boiled tender with greens or carrots. If to be grated as Dutch, then cut a *lean* bit, boil it till extremely tender, and while hot put it under a press. When cold, fold it in a sheet of paper, and it will keep in a dry place two or three months, ready for serving on bread and butter.

II. Rub the beef with one eighth of its weight of salt, to which a little saltpetre has been added, then put it into a tub or other suitable vessel, place a board over it, and pile heavy weights upon it; let it remain so for fourteen to twenty days, then take it out and hang it up for three weeks or a month to dry.

BEEF, HUNTER'S. *Prep.* To a round of beef, weighing twenty-four pounds, take three ounces of saltpetre, three ounces of the coarsest sugar, an ounce of cloves and nutmeg, half an ounce of allspice, and three handfuls of common salt, all in the finest powder. Allow the beef to hang two or three days, remove the bones, then rub the spices well into it, continuing to do so every day for two or three weeks. Before dressing it, dip it into cold water to take off the loose spice. Bind it up tightly with tape, and put it into a pan with a teacupful of water at the bottom; cover the top of the meat with shred suet, and cover the pan with a coarse crust, and brown paper over it. Let it bake five hours, and when cold take off the paste and the tape.

BEEF, LEICESTER SPICED. *Prep.* Take a round of beef, rub in a quarter of a pound of saltpetre, finely pounded; let it stand a day, then season it with half a pound of bay-salt, an ounce of black pepper, and the same of allspice, *both pounded.* Let it lie in the pickle a month, turning it every day.

BEEF, PICKLED. *Prep.* Rub each piece of beef very lightly with salt; let them lie singly on a tray or board for 24 hours, then wipe them very dry. Pack them closely in a tub, taking care that it is perfectly sweet and clean. Have the pickle ready, made thus: Boil four gallons of soft water with ten pounds of coarse salt, four ounces of saltpetre, and two pounds of coarse brown sugar; let it boil 15 minutes, and skim it while boiling very clean. When perfectly cold pour it on the beef, laying a weight on the top to keep the meat under the pickle. This quantity is sufficient for 160 lbs. of beef if closely packed.

BEEF, POTTED. *Prep.* Cut the beef small, add to it some melted butter, 2 anchovies, boned and washed, and a little of the best pepper, all pounded very fine. Beat the whole well together in a marble mortar, until the paste is very smooth and yellow colored, then put it into pots and pour clarified butter over it, about $\frac{1}{4}$ of an inch deep.

BEEF, WELSH. *Prep.* Rub two ounces of saltpetre into a round of beef, let it remain an hour, then season it with pepper, salt, and a fourth portion of allspice; allow the beef to stand in the brine for 15 days, turning it frequently. Work it well with pickle; put it into an earthen vessel, with a quantity of beef-suet over and under it, cover it with a coarse paste and bake it, allowing it to remain in the oven for 6 or 8 hours. Pour off the gravy, and let the beef stand till cold. It will keep for two months in winter, and will be found useful amid the Christmas fare in the country.

BEER, ALE, AND PORTER. *Qual., &c.* Pure malt liquor, which has undergone a perfect fermentation, is perhaps the most wholesome beverage that can be drunk provided it be not taken in excess. Malt liquor bears different names according to its strength and color. Ale is the most nutritious variety, but *good* porter frequently agrees better with bilious constitutions. The most wholesome and perhaps the least exceptionable beverages prepared from malt are those known as East India, Scotch, and Bavarian ales. A late writer has described good beer as *nutritious,* from the sugar and mucilage it contains; *exhilarating,* from its spirit; and *strengthening* and *narcotic,* from its hops. The stronger varieties of ale contain 7 to 8 per cent. of absolute alcohol; average strong ale 5 to 6 per cent.; brown stout 6 to 7 per cent.; London porter $3\frac{1}{2}$ to 4 per cent.; and table beer 1 to 2 per cent. (See BREWING, ALE AND MALT LIQUOR.)

BEER, AMBER. *Prep.* Amber is now out of fashion, but formerly was drunk in great quantities, in London, mixed with bitters, and called purl. The proportions of malt were three quarters amber, and one quarter pale, with six pounds of hops to the quarter. The first liquor is usually turned on at 170°, and the second at 185°. The worts are boiled together for two hours. It is tunned at 64°, and after 24 hours roused every 2 hours, till the heat is increased to 74°. It is then skimmed every hour for 6 hours and cleansed, and generally used as soon as it has done working in the barrels.

BEER, BRAN. A very good article of table beer may be brewed from bran, especially if it be mashed with about $\frac{1}{16}$ of its weight of good malt. A proportionate quantity of hops must be used, and the addition of a little moist sugar will vastly improve it. Bran will yield from 16 to 20 lbs. per barrel, with proper management.

BEER, CHEAP. "No production of this country abounds so much with saccharine matter as the shells of green peas. A strong decoction of them so much resembles, in odor and taste, an infusion of malt (termed wort) as to deceive a brewer. This decoction, rendered slightly bitter with the wood sage, and afterwards fermented with yeast, affords a very excellent beverage. The method employed is as follows:

"Fill a boiler with the green shells of peas, pour on water till it rises half an inch above the shells, and simmer for three hours. Strain off the liquor,

and add a strong decoction of the wood sage, or the hop, so as to render it pleasantly bitter; then ferment in the usual manner. The wood sage is the best substitute for hops, and being free from any anodyne property is entitled to a preference. By boiling a fresh quantity of shells in the decoction before it becomes cold, it may be so thoroughly impregnated with saccharine matter as to afford a liquor, when fermented, as strong as ale."

BEER, POTATO. An excellent beverage may be prepared by mixing the pulped potatoes with about $\frac{1}{12}$ of their weight of good barley malt, and mashing with water at 160°, keeping it at the same temperature for 4 hours; after draining off this wort, a second mash must be made at 180° for 1 hour; the mixed worts must be then boiled with a little hops, cooled and fermented.

BEER, SPRUCE. I. (*White.*) *Ing.* Water 10 gallons; sugar 10 lbs.; essence of spruce ¼ lb.; yeast ½ pint. *Proc.* Dissolve the sugar and essence of spruce in the water, previously warmed; then allow it to cool a little, and add the yeast, as in making ginger-beer; bottle immediately in half-pint bottles.

II. (*Brown.*) For sugar use treacle. *Remarks.* Spruce beer is a pleasant beverage, when well prepared, and possesses slightly diuretic properties.

BEER, SUGAR. *Prep.* Mash a peck of bran in 10 gallons of boiling water for 2 hours, draw off the wort, add 7 lbs. of moist sugar, and boil it with a ½ lb. of hops; then cool it down and add a little yeast. It may be put into the cask the next day, and in 3 days more it may be bunged down. At the expiration of 6 or 8 days it will be fit to drink. This beer will not keep long.

BEER, SUGAR AND MALT. *Prep. &c.* It has been found that 100 lbs. of good moist sugar, mixed with 1 quarter of malt, will produce an equal quantity of wort, and of the same quality, as 2 quarters of malt would do under similar treatment. The best plan is to add the sugar to the wort from the malt, after it is let down from the mash-tun. In other respects the brewing is the same as from malt alone.

BEER, TREACLE. *Prep.* Boil ½ lb. of hops with 14 lbs. of treacle in 36 gallons of water for 1 hour; then strain off the wort and add, when nearly cold, ½ a pint of yeast; the next day it may be put into a cask or bottled.

II. Hops 1 oz.; treacle 1 lb.; water 1 gallon. As above. *Remarks.* A cheap and pleasant beverage when well made. It will not keep for any length of time.

BEER, TABLE. *Prep.* I. Malt 1 bushel; hops ¾ lb. Draw off 1½ barrel of wort at three mashings. (See Brewing.)

II. Malt 8 bushels; hops 7 lbs.; sugar coloring 7 lbs.; Spanish juice 1 lb.; treacle 14 lbs. To produce 10 barrels, or five times the malt.

BEER, TWOPENNY (or *simply*, Twopenny.) *Prep.* Malt 3 bushels; hops 2 lbs.; Spanish juice 2 lbs.; treacle 14 lbs; capsicum ½ oz. To produce 1 barrel, or three times the malt. Drank in cold weather as a stimulant, frequently when only a week old.

BEES. In addition to what has been said under the article Apiary, the following will no doubt prove interesting to the reader.

Mr Cobbett on the management of Bees. The best hives are those made of clean unblighted rye-straw. A swarm should always be put into a new hive, and the sticks should be new that are put into the hive for the bees to work on; for, if the hive be old, it is not so wholesome; and a thousand to one but it contains the embryons of moths and other insects injurious to bees. Over the hive itself there should be a cap of thatch, made also of clean rye-straw; and it should not only be new when first put on the hive, but a new one should be made to supply the place of the former one every three or four months; for, when the straw begins to get rotten, as it soon does, insects breed in it, it smells bad, and its effect on the bees is dangerous.

The hives should be placed on a bench, the legs of which mice and rats cannot creep up. Tin round the legs is best. But even this will not keep down ants, which are mortal enemies of bees. To keep these away, if they infest the hive, take a green stick and twist it round in the shape of a ring, to lay on the ground, round the legs of the bench, and at a few inches from it; and cover this stick with tar. This will keep away the ants.

Besides the hive and its cap, there should be a sort of shed, with top, back, and ends, to give additional protection in winter; though, in summer, hives may be kept too hot, and in that case, the bees become sickly, and the produce light. The situation of the hive is to face the south-east; or, at any rate, to be sheltered from the north and the west. From the north always, and from the west in winter. If it be a very dry season in summer, it contributes greatly to the success of the bees, to place clear water near their home, in a thing that they can conveniently drink out of; for, if they have to go a great way for drink, they have not much time for work.

It is supposed that bees live only a year; at any rate, it is best never to keep the same stall, or family, over two years, except it be wanted to increase the number of hives. The swarm of this summer should always be taken in the autumn of the next year. It is whimsical to save the bees when the honey is taken. They must be fed; and if saved, they will die of old age before the next fall; and though young ones will supply the place of the dead, this is nothing like a good swarm put up during the summer.

A good stall of bees, that is to say, the produce of one, is always worth about two bushels of good wheat. The cost is nothing to the laborer. He must be a stupid countryman indeed who cannot make a bee-hive; and a lazy one indeed, if he will not if he can. In short, there is nothing but care demanded; and there are very few situations in the country, especially in the south of England, where a laboring man may not have half a dozen stalls of bees to take every year. The main things are to keep away insects, mice, and birds, and especially a little bird called the bee-bird; and to keep all clean and fresh as to the hives and coverings. Never put a swarm into an old hive. If wasps or hornets annoy you, watch them home in the day-time; and, in the night, kill them by fire or by boiling water. Fowls should not go where bees are, for they eat them.

On the different kinds of hives.—1. *The common hive.* This hive is too well known to require

any description. It should be made of good clean dry straw, and sufficiently thick and firm to protect the bees. The size of the hive should be proportionate to the size of the swarm placed in it. Care should be taken to avoid covering this hive with a hackle or turf, as it induces mice to build in it, and ultimately to destroy both combs and bees. 2. *Glass hives.* There are various modifications of this useful kind of hive. That of Mr. Moulton consists in placing glasses on a board furnished with holes at the upper part of a straw hive of peculiar construction; when filled with honey these may be removed without injury to the bees or disturbing the economy of the hive. The first year the glasses are only filled once, and generally produce about 8 lbs. of honey of superior quality; but the second year and subsequent years the glasses may be worked twice or oftener. 3. *The double cottage straw hive.* This hive is worked by first hiving the bees in the lower hive, and after 10 days clearing the opening at top and affixing thereon another small hive either of glass or straw. When full, the latter may be removed. 4. *The box hive and hexagon box and straw hives* may be worked in the common way, or by placing a glass hive over it. The management is very similar to the preceding varieties.

Bee-flowers. Bees seldom fly more than a mile for their food; it is therefore advisable to encourage the growth of such flowers as they appear to be most attached to. The following are said to be the most favorable for pasturage, and those that blossom early should be preferred:

Shrubs, &c.	*Flowers.*
Rosemary,	Mignonnette,
Broom,	Lemon thyme,
Heath,	Borage,
Furze,	White clover,
Fruit-blossoms.	Bean-flowers.

Swarming. As soon as a stock has increased to a certain number, which can barely find accommodation in the hive, an inclination to swarm is evinced as soon as a queen bee is ready to lead them. When the bees begin to carry in farina, or pellets on their thighs, it denotes that they have commenced breeding, which frequently begins in February, and does not finish till October. The indication of swarming is the clustering of the bees in great numbers below the resting-board. They never rise but in fine weather, and most frequently about noon; it becomes therefore necessary to observe the hives well during the swarming season, or from April to July. A second cast may generally be expected within 3 or 4 days after the first, but the interval seldom exceeds 8 or 10 days. Should a stock overswarm itself, it will perish unless strengthened; for this purpose, the number of bees that enter the hive should be carefully observed.

Hiving. The method of hiving a swarm of bees varies according to the object on which they may have settled. Should they alight on the ground, place a new hive over them, avoiding injuring any of the bees, or talking at the time, or breathing on them. Should they alight on a tree, the branch may be shaken over the hive, or if *small,* cut off and placed in it, and the hive left on the spot, when the remaining bees will go into it. The hive should then be left near to where they settle until the evening, when it may be gently removed to the bee-house. Ringing a bell, or beating an old kettle, is a common way of collecting the bees together and making them alight.

Reinforcement of weak stocks. Weak swarms of bees should be strengthened. This is done by hiving the swarms as usual, and in the evening striking the bottom of the hive containing the new swarm smartly, on a cloth spread upon the ground. The bees then fall in a cluster on the cloth, when the hive containing the stock to be reinforced must be placed over them as quickly as possible; after the lapse of about a quarter of an hour, they will have become united as one family. Another method is to invert the one hive and to place it in a bucket or pail, then to set the other hive over it; by the next morning the bees in the lower one will have ascended into the upper. The operation of reinforcing stocks is very economical, as it is found that one strong stock will produce more honey than two weak ones.

Weak stocks. Stocks weighing less than 18 or 20 lbs. cannot be safely brought through the winter without feeding. The best food is a mixture of sugar and water, or equal parts of sugar and beer.

BEETLES. The common pest of our kitchens, to which this name is applied, is properly the *blatta* or *cockroach*, which is an insect of the order orthopterous, and not belonging to the coleopterous, or beetle tribe. The blatta, or cockroach, is characterized by its nocturnal appearance, retiring during the day to the cracks and holes in the floors and walls surrounding the fireplaces. It is principally found on the basement floor, and likes a warm damp situation.

Exter. Place a few lumps of unslaked lime where they frequent; or set a dish or trap, containing a little beer or sirup at the bottom, and place a few sticks slanting against its sides, so as to form a sort of gangway for the beetles to climb up by, when they will go headlong into the bait set for them. Another plan: mix equal weights of red lead, sugar, and flour, and place it nightly near their haunts. This last mixture, made into sheets, forms the beetle-wafers, sold at the oil shops.

BEET ROOT. *Qual., Use, &c.* Beet root is cooling, saccharine, and nutritious, and is much used for its color in cookery. It is cooked by either boiling or baking, with a little vinegar and gravy, and is also used as an ingredient in several excellent winter salads. Under the name of mangel wurzel it is much employed for feeding cattle.

BEET ROOT SUGAR. *Prep.* This is made by expressing the juice of the white-rooted beet, and afterwards boiling the marc in water, and again expressing the liquor. The fluids are then mixed, evaporated to the consistence of a sirup, clarified with white of egg, and lastly, evaporated to a proper consistence. *Remarks.* Beet root yields too little saccharine juice (and that of a very inferior quality) to be employed as a source of sugar, as long as cane-sugar is procurable at its present rate. The marc, or cake, left after the process, forms an excellent food for feeding cattle, and especially for pigs and cows.

BELLADONNIN. A volatile alkali, somewhat resembling ammonia, discovered by Luebe

kind in the atropa belladonna. (Phar. Centr. Blatt. für 1839.)

BELL METAL. A species of bronze applied to the manufacture of bells, &c.

Prep. I. Melt together under powdered charcoal, 100 parts of pure copper, with 20 parts of tin, and unite the two metals by frequently stirring the mass. *Remark.* Product very fine.

II. Copper 3 parts; tin 1 part; as above. *Remark.* Some of the finest church bells in the world have this composition.

III. Copper 2 parts; tin 1 part; as above.

IV. Copper 72 parts; tin 26½ parts; iron 1½ parts. *Remarks.* The bells of small clocks or pendules are made of this alloy in Paris.

Remarks. It is absolutely necessary in this process to keep the metals from contact with the air, for which purpose, the powdered charcoal is employed. The union of the two metals in this alloy is so complete, that its gravity is considerably greater than that of the mean of its constituents, thus evincing chemical union to have taken place.

The proportions of the first form are those of the Indian gong, so much celebrated for the richness of its tone. In very small bells, and in those of repeating watches, a little zinc is generally added, which makes them give out their tones the sharper. A less proportion of tin is now generally used for church bells, than for house or clock bells, the tones being thought to be rendered thereby more suitable to their respective purposes. The substitution of zinc for the iron in the last formula, would (I am told) improve the tone.

To give this alloy its highest degree of sonorousness, it must be subjected to sudden refrigeration. M. D'Arcet recommends the pieces to be ignited after they are cast, and then to be suddenly plunged into cold water. They are next to undergo a well-regulated pressure by skilful hammering, until they have assumed their intended form; then to be heated, and allowed to cool slowly in the air. In a general way, however, bells are formed by simple casting. The addition of lead, and other metals, to this alloy, greatly lessens its sonorousness. For common purposes the third form is generally used.

BENZAMIDE. A compound discovered by Wohler and Liebig, supposed to be formed by the union of the two theoretical bases benzule and amide, hence the name. *Prep.* Saturate chloride of benzule with dry ammoniacal gas, reduce the resulting dry white mass to a fine powder, and well wash it with cold water. Dissolve the residuum in boiling water; the benzamide will crystallize out on the liquor cooling. *Remarks.* Benzamide is soluble in water, alcohol, and ether, and is decomposed by both acids and alkalis.

BENZHYDRAMIDE. A compound discovered by Laurent. It is formed by the action of strong liquid ammonia, on $\frac{1}{20}$ of its volume of oil of bitter almonds, at a temperature of about 112°, and purified by boiling in ether, for some time, when crystals will be deposited on cooling. These are again dissolved in boiling alcohol, and purified by filtering and crystallization.

BENZILE. (Discovered by Laurent, who called it benzule, with which it is isomeric.) *Prep.* Pass chlorine gas over melted benzoin, until muriatic acid ceases to be formed; cool and dissolve in hot alcohol, which, on cooling, will deposite crystals of pure benzile. *Prop.* Soluble in alcohol and ether; tasteless, inodorous, volatile, and inflammable.

BENZILIC ACID. (Discovered by Liebig.) *Prep.* Boil benzoine or benzile with a saturated alcoholic solution of potassa, adding more of the latter, as long as a blue color is produced, after the previous portion has been decolored by boiling. Then neutralize with muriatic acid, filter and add muriatic acid in excess; on cooling, crystals of benzilic acid will be deposited. *Prop.* Soluble in water; fusible; with potassa and silver it forms benzilates of those bases, which are crystallizable.

BENZIMIDE. The pearly needles and lamellæ, which separate under certain circumstances from the essential oil of bitter almonds. It was discovered by Laurent, and has been thought by some to be dry benzoate of ammonia.

BENZOIC ACID. *Syn.* Flowers of Benzoin or Benjamin. *Prep.* There are two general methods of procuring this acid from gum benzoin: one by sublimation, or the "*dry way*," as it is commonly called; and the other, by dissolving it out in the form of a salt, from which the acid is afterwards procured; this has been called the "*moist way.*"

I. *By sublimation.*

a. Put 1 pound of coarsely triturated benzoin into an iron pot with a flat bottom, whose diameter is from 8 to 9 inches; the benzoin forming therein a layer of from 1 to 2 inches in depth. The open end of the pot is then to be covered with a sheet of soft and loose blotting paper, (felt, Liebig,) which must be attached to the rim with paste. A cone, formed with strong and thick paper, (cartridge paper,) is then to be capped over the top of the pot, including the blotting paper; and this is also to be attached with paste and string. The apparatus thus prepared, should then be placed on the sand-bath, and exposed from 4 to 6 hours to a gentle heat. After this lapse of time, it may be removed from the sand-bath, inverted, and the string detached, when beautiful white needles, of a silky lustre, possessing the agreeable odor of benzoic acid, will be found in the paper cone.

Prod. From 1 lb. of good benzoin 1½ to 2 oz. of benzoic acid may be procured. The second sublimation ordered in the London Pharm. becomes quite unnecessary when the above method is followed. The following modification of the above is highly recommended by Gauger.

b. Place 12 oz. of coarsely powdered benzoin resin, mixed with sand, in a flat iron vessel capable of containing from 2 to 4 lbs.; cover the mouth of the vessel with loose blotting paper, place therein a stick to support 4 or 5 paper discs, at some distance above the blotting paper, horizontally fixed on the stick; then tilt a paper bag in the form of a sugar-loaf, and formed of a double sheet of paper, (inward blotting paper, and outward sugar paper,) over it, and attach this apparatus by means of a string, around the brim of the vessel. After 6 or 8 hours' exposure in a sand-bath, allow it to cool; take out the benzoic acid from the bag and the paper discs, renew the paper attached over the mouth of the vessel, and again arrange the whole as before, when it must be heated for some hours to a higher temperature. It is advisa-

ble to renew the paper for a third time. The white crystals are separated from the product, the colored crystals strongly pressed between folds of blotting paper, and again sublimed as before. 12 oz. of good benzoin thus furnish from 10 to 11 drachms of fine benzoic acid. Some benzoic acid may afterwards be obtained from the papers employed. (Gauger's Report, 1842.)

c. (*Process at Apothecary's Hall.*) The best gum benzoin is put into an iron pot, set in brickwork, over a proper fire, and communicating by a conical metal neck, with a wooden box lined with paper, as a receiver for the flowers. The sublimation is conducted rather rapidly, and the acid condenses in beautiful elastic prismatic crystals; but if the process be conducted more slowly, the product is proportionately scaly. *Prod.* 10 to 12 per cent. of flowers are thus generally procured, which, after being pressed in blotting paper, are again sublimed, and give 8 or 9 per cent. of very pure acid.

II. *By the moist way.*

a. (*Scheele's process.*) Mix intimately together, equal parts of finely powdered benzoin and hydrate of lime, and boil for 1 hour, with 40 parts of water; filter and evaporate to one-fifth; saturate the lime with muriatic acid, when the benzoic acid will crystallize out as the liquor cools; it should be then either washed or sublimed, after first well drying it. *Remarks.* If a *perfect* mixture of the lime and powdered gum be not first made, the latter will run into a solid mass in the boiling water, and the process will fail. 1 lb. of benjamin yields ℥j, ʒvj, ℈ij of flowers. (Gray.) By my own manipulations I could never succeed in procuring this proportion of acid. The above process is similar to that of the Dublin Pharmacopœia.

b. (*Process of Stoltze.*) Dissolve the resin in 3 times its weight of alcohol, introduce the solution into a retort, and add thereto gradually, a solution of carbonate of soda in weak spirit and water, until all the free acid be neutralized; water equal to twice the weight of the benzoin employed, must be next poured in, and the alcohol removed by distillation. The floating resin should be now skimmed off the remaining liquid, and washed with a little water, which should be added to the contents of the retort, which will deposite crystals on cooling.

c. Boil hippuric acid for 15 minutes in nitric acid, sp. gr. 1·42, then add water, and allow the solution to crystallize; collect the crystals, and purify by sublimation as above. *** Hippuric acid is manufactured from the urine of horses, which is evaporated to ⅛ of its original volume, and then mixed with muriatic acid; after which, the liquid deposites the acid, somewhat impure, under the form of a crystalline powder. Large quantities of benzoic acid are said to be obtained by the above process, but owing to its not being generally well purified, is of inferior quality and unsaleable. It may, however, be rendered quite equal to that obtained from gum benzoin, by careful manipulation. "*A manufactory of sal ammoniac, near Magdeburgh, which uses urine, is able to supply flowers of benjamin by the cwt.*" (Gray.)

Remarks. The manufacture of benzoic acid has lately assumed considerable interest from the scarcity and high price of gum benzoin, which is now from 40*l.* to 50*l.* the cwt. The low price at which this acid has for some time past been sold, is barely sufficient to repay the expenses incurred in its manufacture. The finest gum benzoin is exported in large quantities to Spain, where it is mixed with olibanum and used as incense. Benzoic acid is at the present time very dear, being about 1*s.* 7½*d.* to 1*s.* 8*d.* an ounce, whereas, its usual price averages from 1*s.* ½*d.* to 1*s.* 2*d.* the oz. A large manufacturer, with whom I am acquainted, made a sale some time since at 1*s.* 1½*d.*, of about 300 oz., but has lately greedily taken back the greater portion, which remained unsold, at 1*s.* 4*d.*, besides paying all the expenses of transit, &c.

The product by the process of sublimation is generally greater than by the humid way, and is consequently the one usually adopted. Much, however, depends upon the quality of the gum employed. It is found to be the most economical to use the best benzoin, as it is richer in benzoic acid than the inferior kinds.

Prop., Uses, &c. Form; light feathery white crystals; very soluble in alcohol. It is used in making paregoric, and is sometimes administered in chronic bronchial affections; it is expectorant. *Dose.* 10 to 20 grs. in old coughs.

Pur. 24 parts of boiling water dissolve 1 part of benzoic acid, and again deposite the greater portion on cooling. Freely soluble in alcohol, and in liquor of potassa, from which it is precipitated by adding muriatic acid. When cautiously heated, it wholly evaporates, with an odor of benzoin. It is inflammable. (P. L.)

BENZOATES. Combinations of the bases with benzoic acid.

Prep. The benzoates of ammonia, soda, and potassa, may be made by dissolving with heat benzoic acid in their respective aqueous solutions, until they become perfectly neutral. Most of the other benzoates may be formed in a similar way, or by adding a benzoate of an alkali to a salt of the base.

BENZOINAMIDE. *Syn.* HYDROBENZOINAMIDE. A white, tasteless, inodorous, volatile powder, obtained by heating benzoin with water of ammonia.

BENZOIN. *Syn.* CAMPHOR OF OIL OF ALMONDS. A compound isomeric with benzule, discovered by Robiquet and Boutron Charlard. *Prep.* Mix together equal parts by measure of the raw oil of bitter almonds, and a solution of caustic potassa in alcohol. As soon as the liquid becomes full of crystals, and apparently solid, it must be dissolved in alcohol, filtered, and crystallized. *Prop., &c.* Brilliant prismatic crystals; tasteless, odorless, volatile, and inflammable; soluble in alcohol, and forming with oil of vitriol, and with alcoholic solution of potash, a violet-blue solution.

BENZOLE. *Syn.* BENZINE. Discovered by Faraday among the products of the destructive distillation of organic substances; it resembles ether. *Prep.* Submit a mixture of 1 part of benzoic acid and 3 parts of slaked lime, to distillation, and redistil the oily product with water.

BENZONE. *Syn.* CARBOBENZIDE. An oily liquid, heavier than water, discovered by Mitscherlich and Peligot. *Prep.* The raw product of

the distillation of benzoate of lime, is distilled first in a water-bath, and then afterwards until the heat gradually rises to 920°, as long as benzole comes over. The product is next exposed to a cold of −5°, when the crystals of naphthaline which form must be separated from the liquid, which is pure benzone.

BENZULE. The hypothetical radical of several compounds obtained from the oil of bitter almonds, and supposed to be the base of benzoic acid. Among the principal members of this group may be mentioned *hydruret of benzule*, obtained from a mixture of oil of almonds, milk of lime, and chloride of iron, by distillation; the *chloride of benzule*, obtained from the last article (rendered dry by chloride of calcium) by passing chlorine gas through it, as long as muriatic acid is formed; the *bromide of benzule*, also prepared like the chloride; the *iodide of benzule*, prepared from a mixture of iodide of potassium and chloride of benzule by distillation; the *sulphuret of benzule*, prepared by distillation from a mixture of sulphuret of lead and chloride of benzule; and *cyanuret of benzule*, also prepared by distillation, from a mixture of bicyanide of mercury and chloride of benzule. The series also includes hippuric acid, amygdalinic acid, and amygdaline, as well as several other substances whose names contain (benz-) the first part of the word benzule, as indicative of their constitution.

BERBERINE. A substance discovered by Buchner, in the barberry shrub, (berberis vulgaris.) It belongs to the class of azotized coloring substances. It is soluble in boiling water and in alcohol, from either of which it may be obtained in crystals.

BETULINE. *Syn.* Betulina. A substance discovered by Löwitz, in the bark of the white birch, (the betula alba.) It is obtained under the form of white crystalline needles, soluble in ether, alcohol, oil, and acids. It is fusible, volatile, and inflammable.

BEZOARS. Preternatural concretions found in the stomach and intestines of some animals, formerly supposed to possess alexipharmic powers, and were both taken internally and worn as amulets. They have now, however, sunk into disuse, and though ordered in the preparation of Gascoigne's ball and powder, a factitious kind is substituted. The name bezoar was formerly extended to various other substances supposed to possess similar virtues.

BEZOARS, FACTITIOUS. *Prep.* Make tobacco-pipe clay into a paste with ox-gall, and add a little hair or wool; then form into shapes.

Remarks. This will give a yellow tint to paper, rubbed with chalk, and a green one to quicklime, which tests are considered as proof of genuine bezoars.

BEZOAR, MINERAL. Powder of algaroth deflagrated with nitre in a red hot crucible, and then well washed with water. Once used in doses of 5 to 15 grs. as a diaphoretic, but now obsolete. According to the mode by which the powder of algaroth was made, arose the names bezoardicum joviale and bezoardicum martiale, also applied to this preparation.

BEZOAR, ARGENTINE. *Syn.* Bezoardicum Lunare. Made by distilling a mixture of butter of antimony and nitrate of silver. Once given in epilepsy and head diseases, in doses of 6 to 12 grains.

BEZOAR OF LEAD. *Syn.* Bezoardicum Saturni. Made by distilling a mixture of oxide of lead, butter of antimony, and nitric acid. Once given in doses of 5 or 6 grs. in diseases of the spleen.

BHAURTA, (in Cookery.) An Indian dish made with mashed potatoes, onions, and capsicum, moulded into a shape and slightly baked.

BIBROMISATINE AND BROMISATINE. These are formed by the action of bromine on isatine. Treated with potassa, they yield acids of the same names.

BICARBONATES. Combinations of the bases with the carbonic acid, in which two atoms of the latter are united to one of the former. The following are the principal bicarbonates.

BICARBONATE OF POTASSA. *Syn.* Aerated Kali. *Prep.* There are two methods of preparing this salt: one, by passing a stream of carbonic acid through a solution of the carbonate of potassa; the other, by the addition of sesquicarbonate of ammonia. The processes of the London and Edinburgh colleges offer an example of each.

I. *a.* (*Process of the L. Ph.*) *Ing.* Carbonate of potassa ℔. vj; distilled water 1 gallon. *Proc.* Dissolve the salt in the water, and pass carbonic acid gas through the solution, to saturation; apply a gentle heat to redissolve any crystals that may have been deposited, then set the liquor aside to crystallize; lastly, pour off the liquid and dry the crystals.

_ The carbonic acid may be obtained from chalk or whiting, rubbed up with water to the consistence of a sirup, upon which oil of vitriol, diluted with an equal weight of water, is to be poured.

b. (*Process at Apothecaries' Hall.*) *Ing.* Carbonate of potassa 150 lbs.; distilled water 17 gallons. *Proc.* Dissolve 100 lbs. of the carbonate in the water; then saturate with carbonic acid gas as last, when 35 to 40 lbs. of crystals of bicarbonate of potassa may be obtained. The remaining 50 lbs. of the carbonate are now dissolved in the mother liquor, and enough water added to make it up a second time to 17 gallons, the remaining part of the operation being performed as before. This plan may be repeated again and again.

Remarks. The following plan has been proposed as a substitute for the preceding process, but does not produce a pure salt. Dissolve pearlash in water; add bran or sawdust, to soak up the liquor; put it into a crucible, lute on the cover, and heat it to redness; cool, wash out the salt, evaporate, and crystallize. Repeat the process with the remaining liquor. Yields a very imperfect salt.

II. (*Process of the Ed. Pharm. Cartheuser's Process.*)

a. Carbonate of potassa 6 oz.; sesquicarbonate of ammonia 3½ oz. *Proc.* Triturate together, and when reduced to a very fine powder and perfectly mixed, make them into a stiff paste with water. Dry this very carefully at a heat not higher than 140° Fahr. until a fine powder, perfectly devoid of ammoniacal odor, be obtained, occasionally triturating the mass towards the end of the process.

b. (*Process of Henry and Guibourt.*) Dissolve 500 parts of pure carbonate of potassa in 1000 parts of water; filter, if necessary, and place the fluid in a porcelain capsule; set in a salt-water bath,

and add gradually 300 parts of sesquicarbonate of ammonia. Slightly agitate the liquor until ammoniacal fumes are perceived; then filter over a heated vessel, and set it aside to cool. *Remarks.* The process recommended by Geiger is similar to the last, but the proportions are 1 lb. of carbonate of potassa and 1 lb. 6 oz. of sesquicarbonate of ammonia.

Prop. Use, &c. It is soluble in 4 times its weight of water at 60°; is fixed in the air, but decomposed into a carbonate at a red heat. It possesses the general alkaline properties of carbonate of potassa, but in an inferior degree. It is much used as an antacid, and for making effervescing saline draughts. The *dose* is from 10 grains to ½ a drachm.

20 grs. bicarbonate of potassa in crystals

saturate

14 grs. of crystallized citric acid;
15 grs. " tartaric acid; and
½ oz. of lemon juice.

Pur. and Tests. A solution of corrosive sublimate merely causes an opalescence, or very slight white precipitate in a solution of this salt; if it contains carbonate of potassa a brick-colored precipitate will be thrown down. In other respects it may be tested like the carbonate, which see.

BICARBONATE OF SODA. *Syn.* AERATED SODA. This is prepared in a similar way to the bicarbonate of potassa.

I. *a.* (*Sesquicarbonate of Soda*, P. L.) *Ing.* Carbonate of soda, lb. vij.; water 1 gallon. *Proc.* Dissolve and pass carbonic acid through the solution, in the same way as in making the bicarbonate of potassa.

b. Dissolve 160 lbs. of carbonate of soda in 13 gallons of water, and pass carbonic acid through the solution. The bicarbonate falls down to the amount of about 50 lbs., and may be collected and dried by pressure in an hydraulic press. A fresh portion of soda may be then dissolved in the mother liquor, and the whole process repeated as before. (Brande.)

c. Mix together 1 part of carbonate of soda, with 2 parts of dried carbonate of soda, both in powder, and surround them with an atmosphere of carbonic acid gas, under pressure. Let the action go on till no more gas is absorbed, which will generally occupy 10 to 14 hours, according to the pressure employed, then remove the salt and dry it at a heat not above 120°. This process is a modification both of that of the Edinburgh Pharmacopœia and that of Mr. Smith, described in the Philadelphia Pharmaceutical Journal. Smith, however, employs the salt in crystals. In Scotland the method just described has been adopted with perfect success, and I can, from my own experience, bear testimony to its efficiency.

Remarks. A crude sesquicarbonate of soda has been prepared as follows: Calcine carbonate of soda with bran, as in making bicarbonate of potassa; wash out the salt and crystallize: very inferior.

II. *Ing.* Carbonate of potassa and water, of each 1 lb.; carbonate of ammonia ¾ lb. *Proc.* Dissolve the carbonate in the water, then add the ammonia, and drive off the ammoniacal fumes at a heat under 120°; lastly, set the solution aside to crystallize. *Remarks.* The above are nearly the proportions of the P. L. of 1809. Winckler, however, directs 80 of carbonate of soda, 3 of carbonate of ammonia, and 20 of water; and Henry and Guibourt order 6 parts of the soda, 2 of the ammonia, and 4 of water. The processes I. *b* and I. *c* are those adapted for commercial purposes.

Prop., Use, &c. These are very similar to the carbonate of soda, but it is more feebly alkaline. It loses a part of its acid by heat. The *dose* is from 10 to 40 grains, as an antacid and absorbent. It is largely employed in the preparation of effervescing powders and draughts, for which purpose

20 grs. of commercial bicarbonate of soda

are taken with either

18 grs. of crystallized tartaric acid;
17 grs. of crystallized citric acid; or
½ oz. of lemon juice.

Tests and Pur. Dissolved in 40 parts of water it does not give a reddish precipitate with a solution of corrosive sublimate. (P. E.) It is totally dissolved in water; neither chloride of platina nor sulphate of magnesia throws down any thing from this solution. It is converted into the anhydrous carbonate by heat. (P. L.) The quantity of bicarbonate any given sample contains may be pretty nearly ascertained by well washing 100 grains of the salt with an equal weight of water, and filtering the solution. The residuum left upon the filter, dried at a heat of 120° and weighed, will give the per centage of bicarbonate of soda present, (very nearly.) Dissolved in water this will give only a trifling white precipitate, with corrosive sublimate, as described above, while the filtered portion, which was used to wash the salt, will give a red one, if it contains the simple carbonate of soda.

BICE, BLUE. The native blue carbonate of copper, prepared by grinding and washing. *Use.* As a pigment.

BICE, GREEN. The native green carbonate of copper, prepared as above. *Use.* As a pigment.

BILE, BILIOUSNESS. *Treat., &c.* Persons subject to bilious attacks should be particularly careful to avoid excess in eating and drinking, and should especially avoid using those articles of food which, from experience, they find to disagree with them. A mutton chop under-cooked is an excellent article for the breakfast or lunch of a bilious patient; and mutton or beef, either broiled or roasted, so that the gravy be retained, is better for dinner than many articles apparently more delicate. These, with game and venison, form a good variety from which to choose a bill of fare. New beer and porter should be particularly avoided, as well as puddings and most articles of pastry, as they are very indigestible. Hard cheese, butter, unripe fruit, and especially beans, peas, and nuts, are also objectionable. An attack of bile may frequently be prevented by the use of a saline purgative, and it may generally be removed by an emetic, followed by a dose of castor oil, epsom salts, or seidlitz powders.

BILLS OF FARE. (In cookery and domestic economy.) Lists of the various articles of diet, either actually provided for use, or, being in sea

son, are procurable for that purpose. The following bills of fare, for which I am indebted to "The New System of Cookery," published by Mr. Murray, exhibits at a glance the various articles in season at different periods of the year, and which are usually found at those times upon the greater number of well-provided tables.

Bills of Fare for Family Dinners, &c., containing a list of various articles in season in different months of the year:

First Quarter. January.—Poultry: Game, pheasants, partridges, hares, rabbits, woodcocks, snipes, turkeys, capons, pullets, fowls, chickens, tame pigeons. *Fish:* Carp, tench, perch, lampreys, eels, cray-fish, cod, soles, flounders, plaice, turbot, thornback, skate, sturgeon, smelts, whitings, lobsters, crabs, prawns, oysters. *Vegetables:* Cabbage, savoys, colewort, sprouts, leeks, onions, beet, sorrel, chervil, endive, spinach, celery, garlic, scorzonera, potatoes, parsnips, turnips, brocoli, (white and purple,) shalots, lettuces, cresses, mustard, rape, salsafy, herbs of all sorts, dry and some green; cucumbers, asparagus, and mushrooms to be had, though not in season. *Fruit:* Apples, pears, nuts, walnuts, medlars, grapes.

February and March. Meat, fowls, and game, as in January, with the addition of ducklings and chickens; which last are to be bought in London most if not all the year, but very dear. *Fish:* As the last two months, except that cod is not thought so good from February to July, but may be bought. *Vegetables:* The same as the former months, with the addition of kidney-beans. *Fruits:* Apples, pears, forced strawberries.

Second Quarter. April, May, and June.—Meat: Beef, mutton, veal, lamb, venison, (in June.) *Poultry:* Pullets, fowls, chickens, ducklings, pigeons, rabbits, leverets. *Fish:* Carp, tench, soles, smelts, eels, trout, turbot, lobsters, chub, salmon, herrings, cray-fish, mackerel, crabs, prawns, shrimps. *Vegetables:* As before; and in May early potatoes, peas, radishes, kidney-beans, carrots, turnips, early cabbages, cauliflowers, asparagus, artichokes, all sorts of salads forced. *Fruit:* In June; strawberries, cherries, melons, green apricots, currants and gooseberries for tarts; pears, grapes, nectarines, peaches, and some other fruit; but most of these are forced, and consequently very dear.

Third Quarter. July, August, and September.—Meat as before. *Poultry:* Pullets, fowls, chickens, rabbits, pigeons, green geese, leverets, turkey poults. Two former months plovers, wheat-eaters; geese in September. *Fish:* Cod, haddock, flounders, plaice, skate, thornback, mullets, pike, carp, eels, shellfish, except oysters, mackerel the first two months of the quarter, but not good in August. Partridge shooting begins the 1st of September; what is used before is therefore poached. *Vegetables:* Of all sorts, beans, peas, French beans, &c., &c. *Fruit:* In July; strawberries, gooseberries, pine-apples, plums, various; cherries, apricots, raspberries, melons, currants, damsons. In August and September; peaches, plums, figs, filberts, mulberries, cherries, apples, pears, nectarines, grapes. Latter months, pines, melons, strawberries, medlars, and quinces; in the latter month, Morella cherries, damsons, and various plums.

Fourth Quarter. October, November, and December.—Meat as before, and doe venison. *Poultry and Game:* Domestic fowls as in former quarters; pheasants from the 1st of October; partridges, larks, hares, dotterels; the end of the month wild-ducks, teal, snipes, widgeon, grouse. *Fish:* Dories, smelts, pike, perch, halibuts, brills, carp, salmon-trout, barbel, gudgeons, tench, shellfish. *Vegetables:* As in January, French beans, last crop of beans, &c. *Fruit:* Peaches, pears, figs, bullace, grapes, apples, medlars, damsons, filberts, walnuts, nuts, quinces, services, medlars. In November—*Meat:* Beef, mutton, veal, pork, house lamb, doe venison, poultry and game as the last month. *Fish:* As the last month. *Vegetables:* Carrots, turnips, parsnips, potatoes, skirrets, scorzonera, onions, leeks, shalots, cabbage, savoys, colewort, spinach, chard-beets, chardoons, cresses, endive, celery, lettuces, salad-herbs, pot-herbs. *Fruit:* Pears, apples, nuts, walnuts, bullace, chesnuts, medlars, grapes. In December—*Meat:* beef, mutton, veal, house lamb, pork, and venison. *Poultry and Game:* Geese, turkeys, pullets, pigeons, capons, fowls, chickens, rabbits, hares, snipes, woodcocks, larks, pheasants, partridges, sea-fowls, guinea-fowls, wild-ducks, teal, widgeon, dotterels, dun-birds, grouse. *Fish:* Cod, turbot, halibuts, soles, gurnets, sturgeon, carp, gudgeons, codlings, eels, dories, shellfish. *Vegetables:* As in the last month. Asparagus forced, &c. *Fruit:* As the last, except bullace.

BIRCH SUGAR. *Prep.* This is prepared from the juice procured by boring a hole in the trunk of the birch tree, under one of the largest branches, carrying it quite through the wood to the bark on the opposite side. The juice that flows from the wood is collected in suitable vessels, and after mixing with a little chalk and clarifying with white of egg, is boiled down to a proper consistence.

BIRDLIME. *Prep.* Boil the middle bark of the holly, gathered in June or July, for 6 or 8 hours in water, until it becomes tender; then drain off the water, and place it in a pit under ground, in layers with fern, and surround it with stones. Leave it to ferment for two or three weeks, until it forms a sort of mucilage, which must be pounded in a mortar, into a mass, and well rubbed between the hands, in running water, until all the refuse is worked out; then place it in an earthen vessel, and leave it for four or five days to ferment and purify itself.

Remarks. Birdlime may also be made from mistletoe berries, the bark of the wayfaring tree, and other vegetables, by a similar process. Should any of it stick to the hands it may be removed by means of a little oil of lemon bottoms, or turpentine. *Use.* To rub over twigs to catch birds or small animals. It is said to be discutient when applied externally.

BIRDS *may be preserved* in a fresh state for some time by removing the intestines, wiping the inside out quite dry with a towel, and then flouring them. A piece of blotting paper, on which one or two drops of creosote have been placed, is now to be put inside them, and a similarly prepared piece of paper tied round them. They should then be hung up in a cool dry place, and will be found to keep much longer than without undergoing this process.

BISCUITS. A species of hard, dry, unleavened bread, made in thin flat pieces, and generally composed of flour and water, to which butter, sugar, almonds, and other articles are occasionally added.

BISCUITS, FANCY. *Prep.* Pound 1 lb. of blanched almonds very fine and sprinkle them with a little orange flower water; when reduced to a perfectly smooth paste put it into a small pan, and add a little of the finest flour; mix well and put the pan over a slow fire, and move the paste well about to prevent it burning, until it becomes hard enough not to stick to the fingers; then take it out and roll it into small fillets, and make it into knots, rings, or other shapes, as you may fancy. Next make an icing of different colors, and dip one side of your forms in it and set them to drain on a clean sieve. They may be varied by strewing over them pistachio nuts of different colors, according to fancy.

BISCUITS, SPONGE. *Prep.* Add the whites and yelks of twelve eggs, previously well beaten, to 1½ lbs. of finely powdered sugar, and whisk it until it rises in bubbles, then add 1 lb. of flour and the rind of two lemons grated. Form them into shapes, sift a little sugar over them, and bake them in buttered tin moulds, in a quick oven for one hour.

BISCUITS, DEVILLED. Butter captain's biscuits (or any similar kind) on both sides, and pepper them well, then make a slice of good cheese into a paste, with made mustard, and lay it on one side of each biscuit, spice with cayenne pepper, and grill them. Chopped anchovies, or essence of anchovies, is also a good addition.

BISMUTH. *Syn.* TIN GLASS. MARCASITE. Commercial bismuth is principally prepared in Germany, whence it is exported to England. In this state it generally contains both arsenic and copper. Chemically pure bismuth is made as follows:

Prep. Heat to redness, in a covered crucible, a mixture of the oxide, or subnitrate of bismuth, with half its weight of charcoal.

Use, &c. Bismuth is used in the composition of type metal, solder, pewter, fusible metal, and several other metallic mixtures. When added to other metals it renders them more fusible. An alloy of tin, nickel, bismuth, and silver is said to hinder iron from rusting. (Erdeman's Jour.)

Tests. Bismuth dissolves entirely in nitric acid, from which water and alkalis throw down a white precipitate, and sulphureted hydrogen a black one. The nitric solution is unaltered by adding sulphuric acid.

BISMUTH, BROMIDE OF. This is prepared by heating the metal with an excess of bromine in a glass tube, when a gray-colored mass, resembling fused iodine, is formed. It is volatile, and decomposed by water.

BISMUTH, CHLORIDE OF. *Prep.* Mix together two parts of corrosive sublimate and one part of bismuth, both in powder, and expose the mixture to heat until all the mercury be expelled; a granular substance of a grayish white color remains.

BISMUTH, ESTIMATION OF. I. (*When mixed with bodies unaffected by sulphureted hydrogen.*) Pass sulphureted hydrogen gas through the liquid previously mixed with a large quantity of acetic acid, and diluted with water. Collect the precipitated sulphuret on a filter, wash well with water, and redissolve in nitric acid in excess; dilute with water and filter; wash the sulphur left on the filter with water, soured with nitric acid; mix the whole together, and precipitate the bismuth in the state of oxide by carbonate of ammonia. Allow the liquor to stand for some hours, then collect the deposite on a filter, wash it with water, and ignite it in a porcelain crucible; lastly, weigh it. The weight, in grains of oxide multiplied by ·899, will give the weight of metal in the sample.

Remarks. Should the sample be in the solid state, it may be dissolved in nitric acid in excess, and precipitated by sulphureted hydrogen as above.

II. (*When neither mixed with muriatic acid nor substances precipitated by carbonate of ammonia.*) In this case the oxide of bismuth may be at once thrown down with carbonate of ammonia, ignited, and weighed as before.

III. (*When mixed with lead.*) *a.* "Ullgren precipitates the oxides with carbonate of ammonia and dissolves them in acetic acid; a strip of clean lead, the weight of which is known, is then put into this solution, so that the whole of it is covered. The vessel is closed and allowed to stand for some hours. Bismuth is separated in a metallic state, that which remains on the lead is washed off, and the strip dried and weighed. The bismuth is brought on to a filter and washed with water which has been boiled and allowed to cool; it is then dissolved in nitric acid, evaporated, heated, and the oxide of bismuth weighed. The solution of lead is precipitated with carbonate of ammonia, and the oxide determined. The loss of weight which the lead has suffered gives the quantity of oxide of lead which was not originally in the solution." (Berzelius Jahresbericht, 21.)

b. Add caustic potassa to the nitric solution, in sufficient excess to redissolve all the oxide of lead at first thrown down. The oxide of bismuth remains behind, and may be dried and weighed as before.

BISMUTH, FLOWERS OF. *Prep.* Mix together 2 lbs. of nitre and 1 lb. of bismuth, both in powder, and gradually inject them into an ignited tubulated earthenware retort, having a wide mouth and furnished with a receiver to catch the flowers.

BISMUTH, OXIDES OF. I. (*Protoxide.*) *Prep. a.* Expose the nitrate or subnitrate to a full red heat in a crucible. Color; yellow.

b. Dissolve 2 lbs. of bismuth in 2½ lbs. of nitric acid, and drop it gradually into a solution of 3 lbs. of carbonate of potassa in twice its weight of water; wash the precipitate well with cold water.

Remarks. This is much used by the ladies as a cosmetic. In medicine it has been used as an antispasmodic. *Color:* pearl white.

II. (*Peroxide. Syn. Deutoxide.*) *Prep.* Gently heat the protoxide for some time in a solution of chlorate of potassa, wash it well with water, and then dissolve out any undecomposed protoxide by digestion in dilute nitric acid, formed with 1 part of strong acid to 9 parts of water; afterwards again well wash it with water. A heavy brown powder.

BISMUTH, SUBCHLORIDE OF. *Syn.* PEARL POWDER. *Prep.* Drop a weak solution of common salt, or muriatic acid, into another of bismuth, prepared by dissolving that metal in twice its weight of nitric acid: collect the precipitate and wash it well with water. *Use.* As a cosmetic. Both this article and the subnitrate have received the name of pearl powder, from their extreme beauty and whiteness.

BISMUTH, SUBNITRATE OF. *Syn.* TRISNITRATE OF BISMUTH, (P. L.) WHITE BISMUTH, (P. E.) PEARL-WHITE. MAGISTERY OF BISMUTH. FARD'S SPANISH WHITE. BLANC DE FARD. (*Fr.*) *Prep.* (*Process of the London Ph.*) Dissolve ℥ij of bismuth in f℥iij of nitric acid, previously diluted with f℥ij of distilled water; then add 3 quarts of cold water, and allow the white precipitate to subside. Afterwards decant the clear liquor, wash the powder, and dry it by a gentle heat.

Remarks. The processes of the Dublin and Edinburgh Pharmacopœias are similar. Geiseler has ascertained by comparative experiment that the product is greater, if, according to Duflos, the nitrate of bismuth be allowed to crystallize previously to dilution with water, than if the dilution be executed at once. The proportion of the proceeds was as 10½ to 14, the quality of both preparations being alike. (Ph. C. Bl., Dec. 1842.)

Prop. A white inodorous powder, insoluble in water, but freely so in nitric acid. *Use.* It has been given in some chronic stomach complaints in doses of 5 to 20 grs. and upwards. An ointment formed with 1 part of this substance and 4 parts of lard, has been long in use as a remedy in some chronic skin diseases. Used by the ladies as a cosmetic.

BISMUTH, SULPHURET OF. This is a natural production, but may be prepared artificially by fusing its elements together, or by passing sulphureted hydrogen through a solution of nitrate of bismuth.

BISTRE. A dark brown-colored pigment, used for water-color drawings, after the style of Indian ink. *Prep.* This color is made from the soot of beech-wood, or peat, the former being preferred. The most compact, best colored, and well burnt parcels of the soot are selected from the chimney, reduced to a fine powder, and sifted through a very fine lawn sieve. This powder is then digested in pure cold water for several hours, frequently stirring it up during the time with a rod of glass or wood, after which it is allowed to settle, and the clear water decanted. More water is then poured on, and the process repeated a second, and even a third time. The paste is now poured into a tall narrow vessel, which is then filled up with water, and well agitated; after which the grosser parts are allowed to subside for 2 or 3 minutes, and the supernatant liquor, containing the finer portion of the bistre in suspension, is poured off into another vessel, where it is left to deposite its contents. For very fine bistre, this process is generally repeated a second time. The powder deposited in the last vessel is now collected and partially dried, when gum-water is added, and it is made into cakes and finally dried for use.

Remarks. Bistre is esteemed by artists as superior to Indian ink, for drawings which are intended to be afterwards tinted with other colors. It occupies the same place in water colors that brown pink does in oil painting.

BITES AND STINGS OF INSECTS, REPTILES, &c. *Treat., &c.* The best treatment for the bites and stings of insects, as bees, wasps, hornets, &c., is to wash the part with water of ammonia, or solution of chloride of lime. Should considerable inflammation ensue, and the part become much swollen, leeches may be applied, and a purgative given. The stings of venomous reptiles may be similarly treated, except in cases where they are of a very poisonous description, when the wound should be first well washed with water of ammonia, and afterwards thoroughly seared with lunar caustic in every part, especially the interior and deep-seated portions; or the surface of the wound, both internal and external, may be removed with the knife, or in the case of a small joint, as a finger, the injured portion may be at once amputated. A similar line of treatment should be followed after the bite of a dog supposed to be mad. It has been lately asserted by one of our most celebrated veterinary surgeons, that both he and his colleague have been repeatedly bitten by dogs that have afterwards been proved to be mad, but from having fearlessly applied the caustic to the parts, they have escaped uninjured.

The poison inserted by the stings and bites of many venomous reptiles, is so rapidly absorbed, and of so fatal a description, as frequently to occasion death within a very short space of time, and before any remedy or antidote can be applied. But even in these extreme cases, it is probable that strong liquid ammonia, or solution of chloride of lime, or bichloride of mercury, if at hand, and applied to every portion of the wound, *immediately after* its infliction, would neutralize and destroy the dangerous action of the poison. Unfortunately, however, these wounds are inflicted in parts of the world where precautionary measures are seldom thought of, and generally at times when people are least prepared to meet them, and so suddenly and unexpectedly, as to stagger even those observers who may be in no absolute danger themselves. Such is the bite of the East Indian copra de capello, against which two Carnatic, or Asiatic (arsenical) pills are prescribed by the Hindoos, but which are generally scarcely swallowed, before the poison of the serpent has rendered the patient a stiffened corpse. In all cases of this emergent kind, the remedy must be either one to be applied to the wound, to neutralize the poison before it can be absorbed into the blood, or one that will at once mingle with the circulation, and destroy its action, if already introduced into the system. Medicines taken by the mouth are slow in their action, and require some time to enter into and mix up with the whole mass of blood. When the venom of a rabid dog, or of the more poisonous snakes, is once *fully absorbed into the system*, there appears to be no treatment that can save the patient. A bottle of Madeira wine, drunk in two doses, about 3 minutes apart, has been recommended against the latter, and is perhaps as likely to prove beneficial as any thing else.

BITTERN. *Prep.* A mixture of 1 part each, of extract of quassia and powdered sulphate of

iron, with 2 parts of extract of cocculus indicus, 4 parts of Spanish liquorice, and 8 of treacle. The liquorice is first boiled with water until dissolved, and evaporated to a proper consistence before adding the other ingredients. *Remarks.* This mixture is made by the brewers' druggists, and sent out in casks, disguised, to escape detection. It is employed by the fraudulent brewer to impart a false bitter and strength to his liquor.

BITTERS. Bitters are considered as tonic and stomachic, and to improve the appetite when taken in moderation. The best time is early in the morning, or an hour before meals. An excessive use of bitters tends to weaken the stomach. They should not be taken for a longer period than a fortnight at *one time*, allowing a similar period to elapse before again having recourse to them.

BITTERS, BRANDY. *Syn.* Spirit Bitters. *Prep.* I. Dried orange and lemon peel, of each 2 oz.; fresh ditto, of each 3 oz.; good brandy 1 gallon; lump sugar 1 lb. *Proc.* Digest the peel in the brandy for 10 days, frequently shaking; then press out the liquor and filter through blotting paper; lastly, dissolve the sugar therein. *Remarks.* A very agreeable bitter, either taken as a dram, or mixed with other liquor.

II. Gentian root, bruised, 4 oz.; fresh orange peel 5 oz.; cassia bark 2 oz.; cardamom seeds, bruised, 1 oz.; cochineal, bruised, ½ oz.; proof spirit 1 gallon. *Proc.* Digest for a week, then decant the clear, press the bottoms, and pour thereon 5 pints of water; again digest for 3 days, then press out the liquor, mix the two tinctures, filter and add sugar 2 lbs.

III. Bruised gentian 2 oz.; fresh orange peel 3 oz.; cassia bark ½ oz.; cloves 1 drachm; proof spirit 1 gallon; cape or raisin wine ½ gallon; digest for a week as before, then add sugar 1 lb., and a little coloring, if required.

IV. Bruised gentian ¼ lb.; cochineal ¼ oz.; sugar ¾ lb.; spirit (24 u. p.) 1 gallon.

BITTERS, CALOMBA. *Prep.* Calomba root, fresh orange and lemon peel, of each 1 oz.; proof spirit 1 quart; digest for a week, then express the tincture, add lump sugar 4 oz., and a little coloring.

BITTERS, WINE. I. *Ing.* Bruised gentian root, fresh orange and lemon peel, of each 1½ oz.; white wine 1 quart; digest for a week, and strain.

II. (M. Dubois.) Cinchona bark, bruised, 8 oz.; white canella 1½ oz.; juniper berries, lemon peel, and winter's bark, of each 1½ oz.; carbonate of soda ½ oz.; Madeira wine 1½ gallons; digest for a week.

III. Fresh lemon peel 1 lb.; dried orange peel ½ lb.; bruised gentian root ¼ lb.; cape wine 1 gallon; as before.

Use. As a tonic and stomachic.

BLACK ASH. The waste lye of the soapmakers, evaporated in large iron boilers, the salt separated as it falls down, and then heated in a reverberatory furnace until it is partially decomposed and fused, when it is run into iron pots to cool. *Use.* It is used in the manufacture of common soap and alum.

BLACK, BEECH. *Syn.* Vegetable Blue Black. Made by burning beech-wood in close vessels, and well washing and igniting the charcoal with water. Used as a pigment.

BLACK, BONE. *Syn.* Animal Charcoal. The residuum of the distillation of bone spirit. *Use.* As a pigment; for making blacking; as a material for the moulds of founders; for clarifying and bleaching liquids, and for removing lime from sirup in refining sugar. Sold for ivory-black.

BLACK, (FINE,) BONE. *Syn.* Paris Black. Turners' bone-dust, burnt with great care in covered iron crucibles, and afterwards ground very fine. *Use.* A beautiful black, works well both in oil and water; sold for real ivory-black, and for burnt lamp-black.

BLACK, BRUNSWICK. *Prep.* Melt with care 2 lbs. of asphaltum in an iron pot, then stir in 1 pint of hot boiled oil, mix well, remove the pot from the fire, and when cooled a little, add 2 quarts of oil of turpentine. *Use.* To blacken and polish grates and ironwork.

BLACK, BURNT LAMP. Lamp-black heated in a covered iron crucible until all its greasiness is burnt off. *Use.* As a water-color. Paris black is usually sold for it.

BLACK, COMPOSITI: N. *Syn.* Prussian Black. The residuum of the process of making prussiate of potash from blood and hoofs. *Use.* As a pigment, and instead of bone-black, than which it decolors better.

BLACK DYE. I. (For Cotton and Linen.) *Proc. a.* Steep the goods, previously dyed blue, for 24 hours in a decoction of gall nuts or sumach, then withdraw them, rinse them well in water, and pass them through a bath of acetate of iron for a quarter of an hour; again rinse and air them, then pass them a second time through the bath, to which a little more iron liquor must be added. The whole process may be repeated as often as necessary.

b. Steep the goods in a mordant of acetate of iron, working them well, then pass them through a bath of madder and logwood for 2 hours.

Remarks. About 2 oz. of coarsely powdered galls, or 4 oz. of sumach, are required for every pound of cotton, in the process of galling. The former should be boiled in water, in the proportion of about 3 or 4 pints of water to every pound of cotton, but the sumach bath is better made by mere infusion in very hot water. For a very superior black the stuff must be first dyed blue, as before mentioned.

II. (*For Silk.*) Silks are dyed much in the same way as woollens, but the process is conducted with less heat, and the richness of the dye may be varied at pleasure, by allowing the goods to remain a longer or shorter time in the bath.

Proc. a. Give the silk a bath of gall nuts for from 12 to 40 hours, occasionally working it therein, then take it out, rinse and air it, and run it through a bath containing a little sulphate of iron, for a few minutes; again rinse and air it. The whole operation may then be repeated until the proper depth of color is obtained.

b. Boil 22 lbs. of Aleppo galls, bruised, for 1 hour in 2 hogsheads of water, then add 32 lbs. of copperas, 14 lbs. of iron filings, and 22 lbs. of gum; digest for 1 hour, and when the ingredients are dissolved, pass the silk, previously galled with ¾ of its weight of galls, through the bath for 1

hour, then rinse and air it well; next leave it in the dye bath for from 6 to 12 hours, and again repeat the whole process as often as necessary. The above ingredients are for 1 cwt. of silk.

III (*For Wool.*) Wool and woollen goods are usually dyed blue, preparatory to undergoing the process of being dyed black, as not only is the color thus rendered fuller and finer than it would otherwise be, but also more durable. When the goods are coarse or common, and the price is an object, they are generally "*rooted*" instead of being "*blued.*" This consists in giving them a dun or brown color, with the husks of walnuts, or the roots of the walnut tree. The goods being thus prepared are ready to receive the dye.

Proc. a. Twenty lbs. of logwood chips and 18 lbs. of galls, reduced to a rough powder, are enclosed in a coarse bag, and placed in a suitable sized boiler, where they are boiled with water for 8 or 10 hours; ⅓ of this decoction is then transferred into another copper, with 2 lbs. of verdigris and a sufficient quantity of water. and the goods passed through it for two hours, at a heat but little below boiling. The goods are next drained out, and another ⅓ of the decoction of logwood and galls, and 9 lbs. of copperas added to the boiler; the fire is then lowered, and as soon as the copperas is dissolved, the cloth is again introduced and worked through it well for 1 hour; it is then taken out and aired, and the remaining third of the decoction added, with about 20 lbs. of sumach; the whole is then brought to a boil, and 2 pounds more sulphate of iron added, with a pailful of cold water, after which the goods are put in a third time, and worked for 1 hour; they must then be taken out, washed and aired, and again passed through the bath for an hour. The stuff is now thoroughly rinsed, until the water comes off clean, when it may be dried at once, or further softened and beautified by putting it, for a quarter of an hour, through a hot bath of weld, but not boiling, after which it must be again rinsed. *Remarks.* The above proportions are for 1 cwt. to 1½ cwt. of wool or stuff, and forms a beautiful though expensive dye. The following are simpler and cheaper methods.

b. Make a bath as before with 2 lbs. of fustic, 4½ lbs. of logwood, and 11 lbs. of sumach; boil the cloth therein for 3 hours, then lift it out and add 11 lbs. of sulphate of iron, and when dissolved pass the cloth through it during 2 hours. Next rinse and air the cloth, and again pass it through the bath for 1 hour; lastly, rinse until the water runs clear.

c. Make a bath as before, with 4 oz. of bruised galls, and 1½ lbs. of logwood chips; boil your goods therein for 2 hours, then take them out, and add 4 oz. of green copperas, and when it is dissolved, pass your goods through it for 2 hours, keeping the bath very hot, but not boiling; again take them out, wash and air them well, add 1 oz. more of copperas to the bath, and pass the cloth through it for another hour; lastly, well rinse it. This method is suited to dyeing in the small way in private families. The above ingredients are sufficient for 7 or 8 lbs. of woollen goods, if well managed.

Remarks. In the process of dyeing black, especially on wool, it is necessary to take it out several times, and expose it to the air; this is called "*airing,*" and is done to allow the oxygen of the atmosphere to act upon the dye, without which a good color cannot be produced. The usual proportions employed by the dyers of England are, 5 lbs. each of galls and copperas, and 30 lbs. of logwood for every cwt. of cloth, but these weights are often increased for choice goods.

BLACK DRAUGHT. *Syn.* COMPOUND SENNA MIXTURE.

Prep. I. Infusion of senna f℥xivss.; tincture of senna f℥iss.; epsom salts ℥iv.; carbonate of ammonia ℈j; mix. (U. H.)

II. Senna 13 oz.; boiling water 2 quarts; digest for 4 hours in a hot place, then press out the liquor in a tincture press, and add ¾ of a pint of tincture of senna (co.) and 1 lb. of epsom salts.

III. East India senna 2 lbs.; boiling water 9 quarts; tincture of senna and epsom salts, of each 3½ lbs.; as last.

IV. Senna 8 lbs.; boiling water 9 gallons; epsom salts 16 lbs.; tincture of senna 1½ gallons; treacle and coloring, of each, 1 quart.

V. As last, but instead of tincture of senna, use 3 quarts of spirits of wine and 2 quarts of water.

Remarks. As the above mixture contains but little spirit, and from its great consumption, being made in large quantities, it frequently spoils before the whole is sold, especially in hot weather. To avoid this, 1 drachm of cloves and 2 drachms of mustard seed, both bruised, may be added to every gallon of the strained liquor at the same time with the salts, spirit, and coloring, after which it must be shaken up repeatedly for a few days, and then allowed to repose for a few days more, when it will become as clear as brandy. If wanted immediately it may be at once filtered through a flannel bag.

BLACK, FLOREY. *Syn.* FLOREE D'INDE. The dried scum of the dyer's woad bath. It makes a superior blue-black.

BLACK, FRANKFORT. Vine branches, lees of wine, &c., calcined in covered vessels, and then well washed and ground. *Use.* As a pigment, and to make printer's ink.

BLACK, FROM WINE LEES AND TARTAR. This pigment is prepared by calcination in cylindrical iron pots, furnished with covers, in the centre of which is left a small hole for the escape of the fumes and vapors. When smoke ceases to be evolved, the process is concluded, and after cooling, the whole is well washed and ground fine. *Use.* Similar to Frankfort black.

BLACK, HARTSHORN. Prepared by calcining the residuum of the distillation of spirits of hartshorn. Similar to ivory and bone black.

BLACKING, (FOR DRESS BOOTS AND SHOES.) *Prep.* I. Gum arabic 4 oz.; treacle or moist sugar 1 oz.; ink ½ pint; vinegar and spirit of wine, of each, 1 oz. *Proc.* Dissolve the gum and treacle in the ink and vinegar, then strain and add the spirit.

II. To the above add 1 oz. of sweet oil, and ½ oz. of lamp-black.

III. Beat well together the whites of two eggs, a tablespoonful of spirit of wine, a lump of sugar, and a little finely-powdered ivory-black to thicken.

Remarks. The first two articles are applied to the leather by the tip of the finger or a sponge, and allowed to dry out of the dust, and are only adapted for clean, dry weather, or indoors. The last is laid on and polished with a brush, and then left for a few hours to harden. It may also be used to revive the faded black leather seats and backs of old chairs. All of these possess great brilliancy for a time.

BLACKING, (FOR HARNESS, &c.) *Prep.* Melt 2 oz. of mutton suet with 6 oz. of bees'-wax; add 6 oz. of sugar-candy, 2 oz. of soft soap dissolved in water, and 1 oz. of indigo finely powdered; when melted and well mixed, add a gill of turpentine. Lay it on the harness with a sponge, and polish off with a brush.

BLACKING, (FOR BOOTS AND SHOES.)

I. (*Liquid.*) *Prep. a.* Ivory-black, in fine powder, 1 lb.; treacle ¾ lb.; sweet oil 2 oz.; beer and vinegar, of each, 1 pint. *Proc.* Rub together the first three until the oil be perfectly "*killed*," then add the beer and vinegar.

b. Ivory-black and treacle, of each 1 lb.; sweet oil and oil of vitriol, of each ¼ lb. *Proc.* Mix the first three as before, then gradually add the vitriol, diluted with thrice its weight of water; mix well, and let it stand for 3 hours, when it may be reduced to a proper consistence with water or sour beer.

c. Ivory-black and treacle, of each ½ lb; oil of vitriol 1 oz.; sweet oil 2 oz.; sour beer 1 pint; as above.

d. Ivory-black 7 lbs.; treacle 6 lbs.; sweet oil 1 lb.; oil of vitriol ½ lb.; water q. s., as last.

e. Ivory-black 3 cwt.; crude molasses 2 cwt.; linseed oil 3 gallons; oil of vitriol 20 lbs.; water q. s., as last.

II. (*Paste.*) *Prep. a.* Treacle 1 lb.; ivory-black 1½ lbs.; sweet oil 2 oz.; rub together as before, then add a little lemon juice or strong vinegar.

b. Ivory-black 2 lbs.; treacle 1 lb.; olive oil and oil of vitriol, of each ¼ lb.; water q. s., as before.

c. Ivory-black 28 lbs.; treacle 21 lbs.; common oil 1 quart; oil of vitriol 3 lbs.; water q. s.

d. Ivory-black 3 cwt.; common treacle 2 cwt.; linseed oil and vinegar bottoms, of each 3 gallons; oil of vitriol ¼ cwt.; water q. s.

Remarks. The manipulations required for paste and liquid blacking are the same, the difference in the two being the quantity of liquid added. Thus, by diluting paste blacking with water or beer bottoms, it may be converted into liquid blacking of a similar quality, and, by using less fluid matter, the ingredients of liquid blacking will produce paste blacking. One thing must, however, be observed, and that is, that the ivory-black used for liquid blacking must be reduced to a much finer powder than for paste blacking, as, if this be not attended to, it will settle to the bottom, and be with difficulty diffused again through the liquid. For those persons who do not like the use of blacking containing oil of vitriol, the first of the above forms, either for paste or liquid, may be adopted. The vitriol, however, greatly contributes to promote the shining properties of the blacking, and in small quantities is not so injurious to the leather as has been falsely represented, as it wholly unites itself to the lime of the phosphate contained in the ivory-black, and is thus partly neutralized. This is the reason why *lamp-black* should *never* be employed for blacking, as it has no earthy base to absorb or neutralize the acid, which would then prove very hurtful to the leather. Oil of vitriol is now employed in the manufacture of all the most celebrated shining blackings. The addition of white of eggs, isinglass, gum arabic, and similar articles to blacking, always proves injurious, as they tend to stiffen the leather and to make it crack.

BLACK, JAPAN. *Syn.* BITUMINOUS VARNISH. *Prep.* Fuse by a gentle heat 12 oz. of amber, and 2 oz. of asphaltum, then add 2 oz. of black rosin, and ½ a pint of boiled oil; mix well, remove it from the fire, and when nearly cold, add ¾ pint of spirit of turpentine; mix well together. *Use.* To varnish metals.

BLACK, IVORY. *Syn.* COLOGNE BLACK. CASSEL BLACK. *Prep.* Put into a crucible, surrounded by burning coals, fragments or turnings of ivory, or of the osseous parts of animals, and cover it closely. The ivory or bones, by exposure to the heat, will be reduced to charcoal. When no more smoke is seen to pass through the joining of the cover, leave the crucible over the fire for half an hour longer, or until it has completely cooled. There will then be found in it a hard carbonaceous matter, which must be pounded and ground on porphyry with water, washed on a filter with warm water, and dried. Before it is used it must be again subjected to grinding. *Remarks.* Black furnished by bones is reddish. That produced by ivory is more beautiful. It is brighter than black obtained from peach stones. When mixed in a proper dose with whitelead, it forms a beautiful pearl gray. Ivory-black has a very deep and rich color. The Cologne and Cassel blacks are formed from ivory.

BLACK, LAMP. *Prep.* I. Suspend over a lamp a conical funnel of tin plate, having above it a pipe to convey from the apartment the smoke which escapes from the lamp. Large mushrooms, of a very black carbonaceous matter, and exceedingly light, will be formed at the summit of the cone. This carbon is reduced to such a state of division, as cannot be given to any other matter, by grinding it on a piece of porphyry. This black goes a great way in every kind of painting. It may be rendered less oily and drier by calcination in close vessels.

The funnel should be united to the pipe, which conveys off the smoke, by means of wire, because solder would be melted by the flame of the lamp.

II. This article was originally prepared by burning oil in lamps and collecting the soot in a funnel inverted over it, as above described. Hence the name. It is now, however, generally made on the commercial scale, by burning the oil of bones or common coal tar, previously freed from its ammonia, and receiving the smoke in a suitable chamber. In the patent process of Messrs. Martin and Grafton, the coal tar is violently agitated with lime water, until the two are well mixed, after which it is allowed to subside, and the lime water being drawn off, it is washed several times with hot water. After the whole of the water has been removed by subsidence and decantation, it is put into stills, and heat applied until the impurities have passed over, and the spirit runs clear and smooth. The receiver is then charged, and the heat raised sufficiently high to drive over the whole of the oil

and spirit, leaving only the asphaltum in the still. The tar or liquor in the receiver is then put into a long cast-iron tube, furnished with numerous large burners, underneath which is a furnace to heat the pipe to nearly the boiling point. Over each burner is a sort of funnel, which goes into a cast-iron pipe or main, and which receives the smoke in a similar way from all the burners. From this the smoke is conveyed by large pipes to a box, where the heaviest part of the black is deposited; from this it is carried by pipes to a second box, where another deposite takes place, and from this box the pipe is continued until it passes into a series of large canvass bags, arranged side-by-side, and connected together at top and bottom alternately. Fifty or eighty of these bags are employed, the last one being left open to admit of the escape of the smoke, which has thus been made to traverse a space of about 400 yards. As soon as the bags contain any considerable quantity of black, they are removed and emptied. The black deposited in the last bag is the finest and best, and it becomes progressively coarser as it approaches the furnace.

BLACKLEAD. *Syn.* Plumbago. Carburet of Iron? *Qual. Use, &c.* The best blacklead comes from Cumberland, and is used for making pencils for artists. The coarser sorts are employed to impart a metallic lustre to other bodies, and mixed with grease to diminish friction. Blacklead is also used to cover the face of articles on which it is desired to deposite a coating of copper by the electrotype. It has been used in herpes, and some chronic skin diseases, in the form of an ointment, made with 4 times its weight of lard.

BLACK, PEACHSTONE. The stones or kernels of peaches, cherries, and other similar kinds of fruit, burned in close vessels, then ground and washed well. *Use.* It works well with oil; mixed with white lead and oil it makes old gray.

BLACK, PITCOAL. The best coal for this purpose is that which has a shining fracture. It affords, perhaps, the most useful brown the artist can place on his palette; being remarkably clear, not so warm as Vandyke-brown, and serving as a shadow for blues, reds, or yellows, when glazed over them. It seems almost certain that Titian made large use of this material. Coal, when burned to a white heat, then quenched in water, and ground down, gives an excellent blue-black.

BLACK REVIVER. *Syn.* Paris's Anticardium. *Prep.* I. Blue galls, bruised, 4 oz.; logwood, copperas, iron filings, and sumach, of each 1 oz.; vinegar 1 quart. *Proc.* Macerate in a close vessel, with heat, for 24 hours, then strain off the clear, add the filings and copperas, and shake it occasionally for a week. Keep it in a corked bottle.

II. Bruised blue galls 1½ lbs.; logwood ½ lb.; copperas 6 oz.; vinegar 1 quart; water 3 quarts. As above.

III. Galls 1 lb.; logwood 2 lbs.; copperas ½ lb.; boil for 2 hours in water 5 quarts, until reduced to a gallon, and strain. *Use.* To restore the color of black cloth.

BLACK, RUSSIAN. *Syn.* Russian Lamp-Black. Prepared by burning the chips of resinous deals, and collecting the black matter deposited by the smoke. It is a good black pigment, but apt to take fire spontaneously if left for some time moistened with oil.

BLACK, RICE. Prepared by burning rice in close vessels. The color is very poor.

BLACK, SPANISH. *Syn.* Cork Black. Cork burnt in close vessels, and the charcoal ground and washed with water. A good color, and works very soft.

BLACK, SOOT. The soot of coal fires, ground and sifted. Used as a common paint; mixed with Venetian red and oil, it makes a chocolate color; also used to make gray mortar.

BLACK, SUGAR. *Syn.* Jamaica Black. Prepared by burning sugar in close vessels. It works free, but is deficient in body. It is a warm color for washing drawings, and equal in mellowness to Indian ink and bistre.

BLACK, VINE TWIG. *Prep.* From vine twigs, by calcination as above. With whitelead and oil it produces beautiful shades of silver gray and white.

BLACK, WHEAT. From wheat burnt in close vessels. *Remarks.* A superior black, between ivory and lamp-black; it has a full body and dries hard and quickly with oil.

BLADDERS. *Prep. &c.* These articles are prepared by cutting off the fat and loose membranes attached to them, and washing them first in a weak solution of chloride of lime, and afterwards in clear water; they are then blown out and submitted to pressure by rolling them under the arm, by which they become considerably larger; they are next blown quite tight, dried, and tied up in dozens for sale. *Use.* Employed by druggists and oil and colormen to tie over pots, bottles, and jars, and to contain pill masses, and other similar substances. *Caution.* Never buy bladders unless they are perfectly dry and tight, as, if the reverse be the case, they will neither keep nor prove sound.

BLANCHING OR WHITENING. An operation in cookery, performed by putting tongues, palates, meat, &c., into cold water, when it is gradually brought to boil, and the article taken out and plunged into cold water, where it is left until quite cold. It is intended to impart whiteness, plumpness, and softness.

BLANC, (in Cookery.) A compound, formed by mixing 1 lb. of grated bacon, 1 lb. of suet, ½ lb. of butter, 2 lemons, 3 or 4 carrots cut into dice, 3 or 4 onions, and a little water, and boiling them until done.

BLANCMANGE, (in Cookery.) Jelly, seasoned and made up into forms. *Prep.* I. Isinglass 1 oz.; sweet almonds, 12 in no.; bitter do. 6 in no.; milk 1 quart. *Proc.* Boil the isinglass and almonds grated in the milk, until of a proper consistence when cold; then strain it, and when nearly cold pour it into the moulds, previously rubbed with a little salad oil, and then wiped out again.

II. To the above add ½ lb. of lump sugar and 4 tablespoonfuls of cream; when cold, remelt it and add a tablespoonful of orange flower water, after which it may be moulded as before.

III. Use calves' feet jelly instead of isinglass.

IV. (Mrs. Hoffman's.) Isinglass ¼ lb.; rosewater ½ pint; milk 2 quarts; milk of almonds ½ pint.

V. (*Rice.*) Ground rice 2 oz.; milk 1 pint; lump sugar 3 oz.; a little lemon peel and cinnamon; dissolve the rice in the milk by boiling; reduce it to a

proper consistence, then add the spice and sugar, boil for 1 minute, and strain, and when nearly cold mould as above. *Caution.* The powdered rice must be rubbed up with a little cold water previously to adding it to the milk, to prevent it running into lumps.

VI. (*West Indian.*) Make a jelly with arrowroot, and to every pint, when nearly cold, add a glass of sherry, a spoonful each of brandy and orange flower water, and 2 oz. of lump sugar.

VII. (*Transparent.*) Instead of milk use water, and clarify with the white of an egg.

BLANQUENINE. A name given by Dr. Mills to a new vegetable alkali, which he thought he had discovered in white cinchona bark. (Quar. Jour. Science, Ap. 1828.)

BLANQUETTE, (IN COOKERY.) A sort of white fricasee.

BLEACHING. *Syn.* BLANCHISSAGE. (*Fr.*) BLEICHEN. (*Ger.*) The operation by which the natural colors of substances are discharged, and they become white or colorless. Bleaching may be performed either by natural means, as exposure to light, air, and moisture, or by chemical agents, as chlorine, chloride of lime, sulphurous acid, &c. In many of the processes adopted for this purpose, both methods are combined. The most important application of the art of bleaching in the United Kingdom, is in the manufacture of textile fabrics. The celerity with which this is performed in the most perfect manner, and the trifling expense thereby incurred, contribute, in no small degree, towards inducing that preference universally shown to the productions of the looms of Great Britain.

COTTON, from its original whiteness, and little attraction for coloring matter, is more easily bleached than most other substances. On the old plan, it is first well washed in warm water to remove the weaver's paste or dressing, then "*bucked*" (boiled) in a weak alkaline lye, and after being well washed is spread out upon the grass, or bleaching ground, and freely exposed to the joint action of light, air, and moisture. The operation of "*bucking*" and exposure is repeated as often as necessary, when the goods are "*soured*" or immersed in water acidulated with sulphuric acid, after which they receive a thorough washing in clean water, and are dried. From the length of the exposure upon the bleaching ground, this method has been found to injure the texture of the cloth, and from the number of operations required, necessarily becomes expensive, and produces considerable delay; it has therefore very generally given place to the improved system of chemical bleaching, by means of chloride of lime. In this method, after the first operation of washing and bucking, as in the common process, the cotton is submitted to the action of weak solutions of chloride of lime, and afterwards passed through soured water, when it has only to be thoroughly washed and dried.

LINEN is bleached in a similar way to cotton, but the operation is more troublesome, from its greater affinity for coloring matter.

WOOL is first exposed to the joint action of fuller's earth and soap, in the fulling mill, to remove adherent grease and dirt, and is then well washed and dried, when it is usually found sufficiently white for the purposes of the dyer; but should the slight yellow tint it retains prove objectionable, it is run through water tinged blue with indigo, or it is exposed to the fumes of burning sulphur; the latter method gives it a harsh feel, which is best removed by a bath of soap and water, but this will reproduce its previous yellowishness.

SILK is bleached by boiling it in white soap and water, to remove the natural yellow varnish that covers it, after which it is subjected to repeated rinsings. Articles that are required to be very white, as gloves, stockings, &c., are also submitted to the action of sulphurous acid, or the fumes of burning sulphur.

STRAW is also bleached by the fumes of sulphur; hence arises the sulphurous smell emitted by new straw hats and bonnets. They may, however, be bleached in a much better manner by the use of a little oxalic acid, or chloride of lime.

OLD RAGS, for the manufacture of paper, and paper pulp, are generally bleached with chlorine.

PRINTED BOOKS, ENGRAVINGS, &c., may be whitened by first subjecting them to the action of weak chloride of lime water, next to water soured with sulphuric acid, and, lastly, to pure water, to remove any adhering acid or chlorine.

Remarks. The theoretical principles of bleaching are but little understood; it is thought to depend upon the action of oxygen, in a nascent state, on the particles of coloring matter, but this is unsupported by direct experiment. It is, however, an art eminently indebted to chemistry for its present efficiency, and is based on the practical application of facts which that science has called to light.

BLEEDING FROM THE NOSE. When this occurs under common circumstances, and without violence, it may be regarded as a natural effort to relieve the body from an excess of blood; but when it becomes habitual, or is the result of violence, remedial measures should be had recourse to. A simple means of arresting the hæmorrhage is to introduce, by means of a probe, a small piece of lint or soft cotton, previously dipped into some mild styptic, as a solution of alum, white vitriol, or creosote, or even cold water. This will generally succeed, but should it not, cold water may be snuffed up the nostrils, or a small piece of ice placed in the nose. Should the bleeding be very profuse, or persistent, medical advice should be had recourse to. I once saw a person (an innkeeper) lose his life in the course of a few days from a voluntary hæmorrhage from the nose, which it was found impossible to stop or lessen.

A plan has been lately proposed by Dr. Negrier, of Angiers, which, he says, is simple and certain. "It is preferable to the occlusion of the nostrils, as that is difficult to maintain, especially in sleep. During three years that, in numerous cases, he has tried this method, which is simply elevating the patient's arm, he has never found it to fail. After detailing several cases, he thus explains the rationale of the plan. When the person is standing with the arms at the side, the blood which escapes from the upper part of the arch of the aorta, takes two directions, viz., towards the head, and towards the arms, and that which goes to the head is almost equal in quantity to that which is received by both superior extremities. If, however, the individual who was formerly hanging his arms, raised them, the blood which was flowing horizon-

tally and without effort from the subclavian into the brachial arteries, must then ascend against the weight of the column of blood contained in the latter; and as there is nothing in the act of raising the arm to increase the force of the circulation, it follows, that part of the force formerly expended in sending the blood up the carotids, must now be subtracted, and added to that which drives it through the brachial arteries. This explanation may or may not be confirmed by experiments. The subject is worth investigation." (Archives générales de Médecine. June, 1842.)

BLENORRHŒA. An increased discharge of mucus from the urethra or vagina. *Treat.* Administer mild aperients and tonics. Cold bathing, and general habits of cleanliness, powerfully promote a cure.

BLIND, WRITING FOR THE. If an iron style or pencil, with a moderately fine point, be used to write with upon paper, and a little more pressure be employed than in using a common pen, characters will be produced which may easily be read by blind persons after a little practice, by passing their fingers over them, either on the side on which they were written, where they will appear in intaglio, or by reversing the paper, where they will appear in relief.

BLISTER, EXTEMPORANEOUS. I. A piece of lint dipped into vinegar of cantharides, and immediately after its application to the skin, covered over with a piece of strapping, to prevent evaporation, will speedily raise a blister.

II. Concentrated acetic acid, applied in the same way, will have a similar effect.

III. The following method, proposed by Dr. Darcq, is very simple and convenient: Into a flat watch-glass, pour from 8 to 10 drops of very concentrated ammonia; cover the liquid with a small piece of linen, of a rather less diameter than that of the glass, and slowly apply this little apparatus to the previously shaved skin. Keep the whole in its place by means of moderate pressure with the fingers.

As soon as a red ring, about 2 *centimetres* in breadth, is observed round the glass, it is certain that vesication is effected. Sometimes scarcely 30 seconds is necessary for obtaining this result. It remains only to remove the apparatus, to wash the part, and to tear away with a pair of nippers the epidermis, which comes off easily and in one piece.

The dressing is according to the object in view, —to the indications of the endermic method, for example. (Bull. de Thér. & Chem., No. L. 88.)

BLISTER, LIQUID. *Prep.* I. Spanish flies 2 oz.; boiling water 1 pint; spirits of wine 4 oz.; corrosive sublimate ¼ oz.; spirits of salts ½ oz. *Proc.* Digest the flies in the water, in a warm place, for 24 hours, then add the corrosive sublimate, dissolved in the spirits of wine, and lastly, the spirits of salts. It may either be strained, or used as it is.

II. Rectified spirit, and liquid ammonia, of each 2 oz.; oil of origanum 1 oz.; mix. Add finely powdered Spanish flies 1 oz.

III. Strongest blistering plaster 2 oz.; oil of turpentine 1 oz.; mix with a gentle heat.

IV. Linseed oil, resin cerate, and oil of turpentine, of each 2½ oz.; powdered flies 1 oz.; as above. *Use.* For horses and cattle.

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BLISTER, PERPETUAL. A common blister, raised in the usual way, but instead of allowing the surface to heal up, after the discharge of the water, it is kept open by dressing it with savine or cantharides ointment.

BLISTERING TISSUE. Thin paper, or silk, spread over with a thin coat of alcoholic, acetic, or ethereal extract of Spanish flies.

BLOOD, BULLOCK'S. This article is employed for the clarification of wines and sirups; in the preparation of adhesive cements; coarse paint for out-door work; as a manure; as a bleaching powder; and for several other purposes. The blood of sheep, pigs, and bullocks, mixed with flour or oatmeal, and seasoning, is used as an aliment by the common people, but it is rather indigestible, and consequently cannot prove nourishing.

BLOOD, POWDERED. *Prep.* Dry the blood, by free exposure in thin layers to a current of air, at a heat under 125°, until it becomes sufficiently dry to powder. *Use.* For exportation to the colonies, where it is used in the sugar works. *Remarks.* Bullock's blood, dried at a temperature from 212° to 225°, and coarsely powdered, is much used by fraudulent dealers to adulterate musk.

BLOOD, SPITTING OF. (See Hæmoptysis.)

BLOOD, SPITTING OF. Popular Remedy for. *Prep.* Infusion of red roses 5½ oz.; sirup of poppies ½ oz.; diluted sulphuric acid 20 drops; mix. *Dose.* One or two tablespoonfuls four times a day.

BLOOM, ALMOND. *Prep.* Boil 1 oz. of ground Brazil wood in 3 pints of water, for 15 minutes, strain and add ¾ oz. of isinglass, ½ oz. of powdered cochineal, 1 oz. of alum, and ½ oz. of borax; boil again for 3 minutes, or until the whole is dissolved, and strain through a piece of fine cloth.

BLOWPIPE. An instrument by means of which the flame of a candle or lamp is directed upon any substance placed to receive it, which is thus subjected to an intense heat.

The hottest portion of the flame produced by the action of the blowpipe, is at the tip of the outer white flame, which has also the property of rapidly burning or oxidizing any substance placed in it, which is capable of such an action; hence it has been called the "*oxidizing flame.*" The interior blue flame has also been called the "*reducing flame,*" from the property it possesses of abstracting oxygen from most substances placed in it.

App. "The substance to be submitted to the action of the blowpipe, must be placed on a piece of charcoal, or in a small spoon of platina, gold, or silver; or, according to Saussure, a plate of cyanite may sometimes be used. Charcoal from the pine is to be preferred, which should be well ignited and dried, that it may not crack. The sides, not the ends, of the fibres must be used; otherwise the substance to be fused spreads about, and a round bead will not be formed. A small hole is to be made in the charcoal, which is best done by a slip of plate iron bent longitudinally. Into this hole the substance to be examined must be put, in very small quantity; if a very intense heat is to be used, it should not exceed the size of half a peppercorn.

"Metallic spoons are used when the substance to be examined is intended to be exposed to the action of heat only, and might undergo some change by immediate contact with the charcoal. When the spoon is used, the flame of the blowpipe should be directed to that part of it which contains the substance under examination, and not be immediately applied to the substance itself. The handle of the spoon may be inserted into a piece of charcoal; and if a very intense heat is required, the bowl of the spoon may be adapted to a hole in the charcoal. Small portions may be taken up by platina forceps. Salts and volatile substances are to be heated in a glass tube closed at one end, and enlarged according to circumstances, so as to form a small matrass."

When the behavior of the substance has been observed in this way, it is melted with various fluxes, as microcosmic salt, borax, &c., and their action examined, both in the interior and exterior flame, by which means its composition may be generally ascertained, by reference to any work on mineralogy.

Beginners are usually unable to maintain a continual stream of air from the jet, which is, however, very simple to accomplish. The operation depends upon a little artifice in blowing through the pipe, which is in reality more difficult to describe than to acquire. "The effect intended to be produced is a continual stream of air for many minutes, if necessary, without ceasing. This is done by applying the tongue to the roof of the mouth, so as to interrupt the communication between the mouth and the passage of the nostrils; by which means the operator is at liberty to breathe through the nostrils, at the same time that by the muscles of the lips he forces a continual stream of air from the anterior part of the mouth through the blowpipe. When the mouth begins to be empty, it is replenished by the lungs in an instant, while the tongue is withdrawn from the roof of the mouth, and replaced again in the same manner as in pronouncing the monosyllable *tut*. In this way, the stream may be continued for a long time without any fatigue, if the flame be not urged too impetuously; and even in this case no other fatigue is felt than that of the muscles of the lips." (Ure.)

For producing extreme degrees of heat, the flame is blown with a jet of oxygen gas, and the instrument is then called an "*oxygen blowpipe;*" or a mixture of oxygen and hydrogen is burned, when it is called an "*oxy-hydrogen*" blowpipe. The heat produced by the last is so great that no substance can stand before it. The most refractory native compounds, as rock crystal, quartz, flint, chalk, plumbago, &c., are immediately fused. Gold is volatilized, and iron is rapidly consumed the instant it is placed in the flame. To use this wonderful instrument with safety, and to prevent an explosion, a peculiarly constructed jet is required. The principal blowpipes in general use are figured in the accompanying engravings. The shape of the common blowpipe adopted by the experimentalist may depend upon the fancy of its employer.

This apparatus is also furnished with valves and springs.

Beside the following there are several other va-

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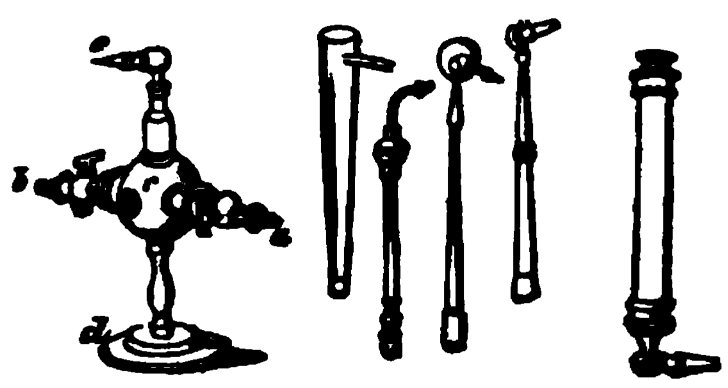


1, Oxy-hydrogen blowpipe.
2, Black's do.
3, Bergman's do.
4, Pepy's do.
5, Wollaston's do.
6, Hemming's safety jet for the oxy-hydrogen ditto.

a, Pipe conveying oxygen gas.
b, Do. do. hydrogen gas.
c, Ball stuffed with fine wire gauze.
e, Jet, (internal diameter 1-80th of an inch.)

rieties of blowpipes, in which the air is expelled by the pressure of a column of water, (hence called "*hydrostatic blowpipes,*") or the flame blown with the vapor of boiling alcohol, ("*spirit blowpipe.*")

Use. The blowpipe is of most extensive application in qualitative analysis, especially of minerals, and its use cannot be too highly recommended to the young chemist.

For further information on this subject the reader is referred to Gahn on the Blowpipe; to Ure's Dictionary of Chemistry; to Campbell's Translation of Kobell's Instructions for the Discrimination of Minerals; and to the Chemist, iv. 462.

BLUBBER. This substance, which is so plentiful on some parts of the coast of England, forms a very rich manure for pasture and arable land, when used at the rate of 1 ton to every 20 or 30 loads of mould, together with a chaldron of lime per acre. It must be well turned over, and after lying 3 or 4 months the land will be in prime condition.

BLUE, CHARCOAL. *Prep.* Triturate carbonized vine stalks with an equal weight of potash, then put it into a crucible and place it over the fire, until the mixture ceases to swell, keeping it well stirred all the time; next allow it to cool, dissolve it in water, and saturate the excess of alkali with dilute sulphuric acid; the liquid becomes blue, and a dark precipitate falls down, which turns of a brilliant blue color when dried and heated.

BLUE, COBALT. *Prep.* I. Dissolve Zaffre 1 lb. in ¾ lb. of nitric acid, diluted with an equal weight of water, by digestion for some hours, evaporate nearly to dryness, then dissolve in warm water, filter and add a solution of phosphate of soda as long as any precipitate falls down; collect this on a filter and wash it with cold water, then mix it while still moist with 8 times its weight of freshly precipitate hydrate of alumina, also well washed and still moist. Stir them together until dry; lastly, expose the mixture to a cherry red heat in a crucible, after which cool the mass, and reduce it to a fine powder.

II. Precipitate a solution of nitrate of cobalt as above, and proceed as before.

III. Make a strong solution of neutral nitrate

of cobalt, and mix it with pure moist alumina, then dry it and proceed as before.

IV. Precipitate a solution of nitrate of cobalt with ammonia alum, collect the precipitate, wash, dry, and heat it to a cherry red as before.

Use. A beautiful blue pigment, very permanent.

BLUE, CHEMIC. *Syn.* SAXON BLUE. LIQUID BLUE. SULPHATE OF INDIGO. *Prep.* I. Indigo 1 lb.; oil of vitriol 8 lbs. *Proc.* Put the acid into an earthenware pan, placed in a tub of water to keep it cool, and add the indigo, previously reduced to fine powder, in small successive portions, carefully stirring to prevent it *heating.* When all the indigo has been added, cover up the vessel and let it stand for 4 hours, occasionally stirring it during the time; lastly, dilute it with an equal weight of water.

II. Indigo 1 oz.; oil of vitriol 4 oz.; dissolve as before; the next day add 1 oz. of dry potash; let it stand a day longer, then dilute it with 12 oz. of water.

Use. In dyeing greens and blues, either without preparation or with a mordant of alum and tartar.

BLUE, CHINA. *Syn.* ROYAL SMALTS. *Prep.* Grind together oxide of cobalt or zaffre, with an equal weight of potash, and 8 times its weight of feldspar. Then submit the mixture to fusion in a crucible. *Use.* To paint pottery, and as a pigment.

BLUE, IRON. *Prep.* Precipitate a filtered solution of protosulphate of iron, with another of phosphate of soda. Collect the powder, wash and dry it. *Use.* A lively sky-blue.

BLUE, MOLYBDENUM. *Prep.* Dissolve sulphuret of molybdenum in nitric acid, then add some tin filings and a little muriatic acid. After digestion for some time, pour off the clear and evaporate to dryness. Mix the powder thus obtained with moist hydrate of alumina, as in making cobalt blue, and heat it to nearly a dull red.

BLUE, MOUNTAIN. Carbonate of copper, mixed with earthy matter.

BLUE, SAXON. *Prep.* Dissolve 1 oz. of sulphate of iron and 8 oz. of alum in 1 gallon of water, then add simultaneously, separate solutions of prussiate of potash and common pearlash, until they cease to produce a precipitate; lastly, allow the liquid to deposite, decant the clear portion, wash the remainder well with water, and dry it. Or a solution of the sulphate of iron may be first made and precipitated with the prussiate of potash, and instantly mixed with the solution of alum and a solution of pearlash, added until it ceases to produce a precipitate.

BLUE, SUPERB LIQUID. *Prep.* Put into a small matrass or common vial 1 oz. of pure Prussian blue reduced to powder, and pour over it from 1½ oz. to 2 oz. of concentrated muriatic acid. The mixture produces an effervescence and the prussiate soon assumes the consistence of thin paste. Leave it in this state for 24 hours, then dilute it with 8 or 9 oz. of water, and preserve the color thus diluted in a bottle well stopped.

The intensity of this color may be lessened, if necessary, by new doses of water. If the whole of this mixture be poured into 1 quart of water, it will still exhibit a color sufficiently dark for washing prints.

BLUE, STONE. *Syn.* FIG BLUE. THUMB BLUE. KNOB BLUE. CROWN BLUE. MECKLENBURG BLUE. QUEEN'S BLUE. *Prep.* Mix finely powdered indigo with starch paste until a proper color be produced, then make it into small lumps. II. Instead of starch use whiting and a little weak size. *Use.* Employed by laundresses to give a faint blue tinge to linen.

BLUE DYE. *Proc.* First give the goods a mordant of alum, then rinse them well and boil them in a bath of logwood, to which a small quantity of blue vitriol has been added.

II. Boil in a bath of logwood, then add 1 oz. each of tartar and verdigris to every pound of logwood employed, and boil again.

III. Bilberries, elder-berries, mulberries, privet-berries, and several other vegetable blue substances, may be used to dye blue as above instead of logwood.

Remarks. By increasing the proportion of alum the color verges on purple, and by employing a little acetate of iron or green copperas, the darker shades are produced. Verdigris, blue vitriol, and alkalis turn it more on the blue, and a mordant of tin imparts a violet cast. None of these dyes, however skilfully managed, are so permanent as those produced with indigo and Prussian blue. (See INDIGO, PRUSSIAN BLUE, and DYEING.)

BOARDS, MARBLE, &c., TO TAKE OIL AND GREASE OUT OF. I. Make a paste with fuller's earth and hot water, cover the spots therewith, let it dry on, and the next day scour it off with soft or yellow soap.

II. Make a paste with soft soap, fuller's earth, and a little pearlash, and use it as above.

III. Make a paste of fresh slaked lime, water, and pearlash, and use it as above. *Remarks.* Observe not to touch the last mixture with the finger, as it is very caustic unless it be largely diluted with water.

BOERHAAVE'S RULES FOR PRESERVING HEALTH.

"Keep the feet warm;
The head cool; and
The body open."

These rules are very concise, and convey directions which, though valuable, are too often neglected.

BOILING POINT. The boiling point of water may be raised considerably above 212° Fahr. by the addition of saline matter. Thus, 60 parts of dry acetate of soda added to 40 of water raise the boiling point to 256° Fahr., and 30 parts of muriate of soda added to 70 of water raise it to 224 Fahr. As in practice, however, it proves inconvenient to employ a saturated solution for a bath, from the evaporation of the water continually inducing the salt to crystallize, it is usual to keep it considerably below that point. By means of such solutions the chemist is enabled to evaporate fluids and desiccate solids at any required temperature. The boiling point of baths containing different salts may be seen below.

TABLE of the Boiling Points of several Saline Solutions, abridged from the Table of Mr. T. GRIFFITHS. (Jour. Science, xviii. 89.)

Names of Salts.	Dry Salt in 100.	Boiling Point.
Acetate of soda, . . .	60	256° F.
Nitrate of soda, . . .	60	246
Rochelle salt, ...	90	240
Nitre, ...	74	238
Muriate of ammonia, .	50	236
Tartrate of potash, . .	68	234
Muriate of soda, . . .	30	224
Ditto, ...	20	218·75
Muriate of lime, . . .	40	216·5
Sulphate of magnesia, .	57·5	222
Supersulphate of potash,	?	222
Borax, ...	52·5	222
Phosphate of soda, . .	?	222
Carbonate of soda, . .	?	220
Muriate of baryta, . .	45	220
Alum, ...	52	220
Sulphate of potash, . .	17·5	215
Bitartrate of potash, .	9·5	214
Sulphate of soda, . .	31·5	213

Remarks. From 5 to 9 degrees are usually lost by passing through the vessel, depending on its thickness and materials. The boiling point of water in glass vessels, under common circumstances, varies from 212·54° to 215·6°, and in perfectly pure and smooth glass vessels, water may be heated to 221° F. without boiling. (M. F. Marcet.)

BOILS. *Treat.* When these appear, suppuration should be promoted by poultices of bread and linseed meal, to which a little fat or oil may be added, to prevent their getting hard. When poultices are inconvenient, exposure to the vapor of hot water, or the application of stimulating plasters, may be adopted instead. When sufficiently ripe, the matter should be evacuated, and the wound dressed with a little simple ointment spread on a piece of clean lint or linen. The diet may be full and liberal until the maturation of the tumor and the discharge of the matter, when it should be lessened, and the bowels opened by some saline purgatives, as salts or cream of tartar. When there is a disposition in the constitution to the formation of boils, the bowels should be kept regular, and tonics, as bark or steel, taken, with the frequent use of sea-bathing, if possible.

BOLAS. *Prep.* Into 2 lbs. of flour pour ¾ pint of warm milk, a small teacupful of yeast, and 6 eggs; make them into a dough, add 1 lb. of butter, by degrees, and let it rise for 1 hour, then mix in 1 lb. of powdered sugar, and make the mass into cakes; put these into cups or tins previously well buttered, and ornament the top with candied orange or lemon peel; lastly, bake them.

BOLUS OF ALUM. *Prep.* Powdered alum and conserve roses, of each 15 grs.; sirup of orange peel or saffron to mix. *Used* in fluxes, &c.

BOLUS OF MUSK. *Prep.* I. Musk 15 grs.; camphor 5 grs.; powdered gum 3 grs.; mix with sirup of saffron. *Use.* In convulsions and typhus fever.

II. Musk and carbonate of ammonia of each 10 grs.; conserve of roses q. s.; to make a bolus. *Use.* Sometimes given every three hours in mortification accompanied with spasms.

BOLUS, PURGING, (FOR DOGS.) *Prep.* Jalap and rhubarb, of each 15 grs.; ginger 4 grs.; soap 10 grs.; water q. s.; if this does not open the bowels, add aloes half a drachm, or 3 or 4 grs. of calomel. *Use.* In the distemper; it must be preceded by copious bleeding, and abstinence from food for a day or a night.

BOLUS OF SULPHATE OF ZINC. *Prep.* Sulphate of zinc 20 to 25 grs.; conserve of roses q. s. to make a bolus. *Use.* As an emetic where poison has been taken, to be followed by copious draughts of warm water or weak tea.

BOLETIC ACID. An acid discovered by Braconnot in the juice of the boletus pseudo-igniarius.

Prep. Concentrate the expressed juice to a sirup by means of a gentle heat, then digest it in strong alcohol, and dissolve the residuum in water; add a solution of nitrate of lead as long as any precipitate falls, which must be washed with water, diffused through water in a tall glass vessel, and in this state a current of sulphureted hydrogen must be passed through it, until the lead is thrown down; filter, evaporate, and crystallize; lastly, purify by resolution and crystallization from alcohol.

Remarks. This acid dissolves in 45 parts of alcohol and 180 of water, and is volatile. It is doubtful whether it be a distinct acid principle.

BOLOGNA VIAL. The bologna, or philosophical vial, is a small vessel of glass which has been suddenly cooled, open at the upper end, and rounded at the bottom. It is made so thick at the bottom that it will bear a smart blow against a hard body without breaking; but if a little pebble, or piece of flint, is let fall into it, it immediately cracks, and the bottom falls into pieces; but unless the pebble or flint is large and angular enough to scratch the surface of the glass, it will not break.

BOLOGNIAN PHOSPHORUS. *Syn.* BOLOGNIAN STONE. This is a phosphorescent stone that once excited great attention. It was accidentally discovered by a shoemaker of Bologna in the 17th century. A family of the name of Logani, who were very successful in making it, acquired a large fortune by selling it to the curious throughout Europe.

Prep. Powder native sulphate of baryta that has been previously ignited, and make it into a paste with mucilage of gum arabic; roll this into pieces a quarter of an inch thick, and dry them in a moderate heat; then expose them to the heat of a wind furnace by placing them loose among the charcoal.

Prop., Use, &c. Placed in a vial and exposed for a few minutes to the sun's rays, it will give light enough in the dark to see the figures on the dial-plate of a watch.

BOMBIC ACID. An acid which M. Chaussier extracted from the silkworm in 1781. It has since been found not to be a distinct acid.

BON-BONS. *Prep.* Provide leaden moulds, which must be of various shapes, and be oiled with oil of sweet almonds. Take a quantity of brown-sugar sirup in the proportion to their size, in that state called a *blow,* which may be known by dipping the skimmer into the sugar, shaking it, and

blowing through the holes, when parts of light may be seen; add a drop of any esteemed essence. If the *bon-bons* are preferred white, when the sugar has cooled a little, stir it round the pan till it grains, and shines on the surface; then pour it into a funnel and fill the little moulds, when it will take a proper form and harden: as soon as it is cold take it from the moulds; dry it for two or three days, and put it upon paper. If the *bon-bons* are required to be colored, add the color just as the sugar is ready to be taken off the fire.

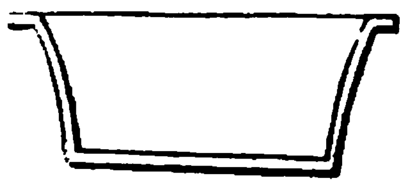
BONES. The bones of animals are employed for various purposes in the arts, manufactures, and domestic economy. (See the succeeding articles.)

BONE ASH. *Syn.* Impure Phosphate of Lime. *Prep.* Calcine bones to whiteness, and reduce the ash to fine powder. *Use.* To make pure phosphate of lime, and to form cupels. It is sold for burnt hartshorn.

BONE BLACK. *Syn.* Animal Charcoal. Ivory-Black. Bones burnt in close vessels.

Prep. On the large scale, two different processes are adopted to produce bone black.

I. (*From bones as the sole product.*) The bones broken to pieces are put into small cast-iron pots of the shape of the engraving, and varying from



$\frac{3}{8}$ to $\frac{1}{2}$ an inch in thickness. Two of these being filled, are dexterously placed with their mouths together and then luted with loam. A number of vessels, thus prepared, are placed side by side and over each other, in an oven resembling a potter's kiln, to the number of 100 to 150. The fire is then kindled, and the heat kept up strongly for 10 or 12 hours, according to circumstances, until the process is completed. The whole is allowed to cool before opening the pots.

II. (*The residuum of the manufacture of Bone Spirit.*) The bones are here introduced into retorts similar to those used at the gas works, and heat being applied, the volatile products are conveyed away by iron pipes to cisterns where its condensable portion is collected. As soon as the process of distillation is finished, the solid residuum in the retorts, while still red hot, is removed through their lower ends into wrought-iron canisters, which are instantly closed by air-tight covers, and luted over. These are then raised to the ground by a crane and allowed to cool.

Remarks. Previously to distillation or calcination, the bones are boiled for their grease, which is sold to the candle and soap makers. They are then sorted, the finest pieces being selected for making handles for knives, tooth-brushes, buttons, &c.; the next sort for making into bone black; while the smallest and worst description is reserved for grinding into manure. The bones lose about $\frac{1}{2}$ their weight by the process of burning. After this they are ground in a mill, sorted by sieves into two kinds, one *granular*, somewhat resembling gunpowder, and the other *quite fine*. The one is sold under the name of *animal charcoal*, for decoloring liquors, the other as a *pigment*. This article possesses the valuable property of taking lime from sirups, at the same time that it decolors them. Its power as a decolorizer may be tested by adding it to a solution of brown sugar or molasses, or water containing $\frac{1}{1000}$ part of indigo dissolved in sulphuric acid. The test should be made in a small glass tube. By well washing and careful reburning, this charcoal may be used any number of times as a decolorizer.

BONES AND IVORY, DYES FOR. 1. (*Red.*) *a.* Make an infusion of cochineal in water of ammonia, then immerse the pieces therein, having previously soaked them for a few minutes in very weak aquafortis and water.

b. Boil the bones with 1 lb. of Brazil dust, in 1 gallon of water, for 3 hours, then add $\frac{1}{4}$ lb. of alum and boil for 1 hour more.

2. (*Black.*) *a.* Immerse the pieces in a weak solution of nitrate of silver, for a short time, then expose them to the sunlight.

b. Steep for 2 or 3 days, in a decoction made with 1 lb. of galls and 2 lbs. of logwood, then steep for a few hours in iron liquor, (acetate of iron.)

3. (*Green.*) *a.* Steep in a solution of verdigris to which a little aquafortis has been added.

b. Dissolve distilled verdigris in weak vinegar, and steep the pieces therein.

c. Steep in a solution of 2 parts of verdigris, and 1 of sal ammoniac. *Observe* not to use a metallic vessel for the above.

4. (*Purple.*) *a.* Steep in a weak solution of terchloride of gold.

b. Boil for 6 hours in a decoction of 1 lb. of logwood in $\frac{1}{2}$ gallon of water, adding more water, as it wastes by boiling, then add 2 oz. of alum, and boil for 1 hour more.

5. (*Yellow.*) *a.* Boil for 1 hour in a solution made with 1 pound of alum in 1 gallon of water, then take out the pieces and steep them in a decoction made with $\frac{1}{2}$ lb. of turmeric in 2 quarts of water; lastly, mix the two liquors and boil them therein for 1 hour.

b. Steep the pieces for 24 hours in a solution of sugar of lead, then take them out, and when dry, immerse them in a solution of chromate of potassa.

c. Dissolve as much of the best orpiment in water of ammonia or hartshorn, as it will take up, then steep the pieces therein for twenty-four hours; lastly, take them out and dry them, when they will turn yellow. *Remark.* By diluting the solution with water, any shade of yellow may be made.

6. (*Blue.*) *a.* Stain them green, then steep them in a hot and strong solution of pearlash.

b. Boil them in a strong decoction of logwood, and afterwards steep them in a solution of blue vitriol.

c. Steep them for a short time in a weak solution of sulphate of indigo, to which a little salt of tartar has been added; or, still better, boil them in a dyer's green indigo vat. *Remarks.* The bones of living animals may be dyed by mixing madder with their food. The bones of young pigeons may thus be tinged of a rose color in 24 hours, and of a deep scarlet in 3 days; but the bones of adult animals take a fortnight to acquire a rose color. The bones nearest the heart become tinged soonest. In the same way extract of logwood will tinge the bones of young pigeons purple. (Mr. Gibson.)

BONE GREASE. *Prep.* By bruising and boiling the refuse bones of the kitchen, and skimming the broth when cold, from $\frac{1}{4}$ (?) to $\frac{1}{8}$ of their

weight of good fat may be obtained, fit for culinary purposes when fresh, but always excellent for making soap and candles. (Proust.)

BONE GLUE. *Syn.* GELATINE. *Prep.* This is made by dissolving out the earth of bones, previously boiled for the grease, washing the remaining jelly with water, then boiling it with a little water, and forming it into cakes for sale. (SEE GLUE.)

BONE MANURE. For this purpose the bones are ground to a coarse powder in a mill, and sowed along with the seed in a drill. It is said that wheat thus treated yields 30 to 50 per cent. more in weight of straw and grain than by the common methods. It is usually applied to light or turnip soils, which it renders more than ordinarily productive. Bone manure is much used in the west of Yorkshire, Holderness, and Lincolnshire. The usual quantity per acre is 70 bushels, when used alone; but when mixed with ashes, as common manure of any sort, 30 bushels per acre is thought quite enough. It is applied at the same periods as other manure, and has been found in this way to remain 7 years in the ground. The rough part of this manure, after being 5 years in the ground, has been gathered off one field and thrown upon another of a different soil, and has proved, even then, good manure.

BONES, (IN COOKERY.) The bones of good meat form most excellent materials for making soups and gravies, as is well known to every good cook. In France, soup is extensively made by dissolving bruised bones in a steam heat of 2 or 3 days' continuance, and also by dissolving out the earthy part by digestion in weak muriatic acid, when a lump of gelatine is obtained, which after being well washed with water will dissolve by boiling, and is equal to isinglass for all the purposes of making soups and jellies. Proust has recommended the following process for making the best of bones, in hospitals, jails, and similar establishments:—Crush the bones small, then boil them for 15 minutes in a kettle of water, cool, and skim the fat off, which varies from $\frac{1}{8}$ to $\frac{1}{4}$ (?) of the weight of the bones employed, and when fresh is fit for all common purposes. The bones are then ground, and boiled in 8 to 10 times their weight of water, of which that already used must form a part, until $\frac{1}{2}$ is wasted, when a very nutritious jelly is obtained. A copper vessel should not be used, as the jelly acts upon this metal. An iron Papin's digester is the most suitable. The bones of boiled meat are nearly as productive as those of fresh meat, but roasted meat bones scarcely afford any jelly. (Dr. Young.) As boning meat before cooking is now a very general practice, a quantity of fresh bones may always be had.

BONE SHAVINGS. *Syn.* BONE DUST. BONE TURNINGS. These yield a beautiful jelly by boiling with water, nearly equal to that produced from hartshorn shavings, for which they are very frequently sold.

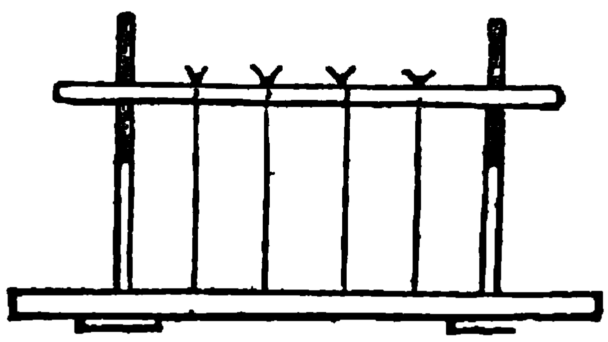
BOOKBINDING. The process of binding books may be divided into several distinct operations, which, in large establishments, are usually performed by different persons, such a method being found to produce greater expedition and better work, than when the whole is done by one person.

The sheets received from the hands of the printer are—

1. *Folded*, which is done correctly by observing the marks or catchwords at the bottom of the pages. As the sheets are folded they are laid upon each other in proper order, and are ready to undergo—

2. *The operation of beating.* This is performed by laying them upon a large stone, and striking them with a heavy smoothed-faced hammer, or by passing them through a rolling press. The former method is usually adopted in the small way, and the latter on the large scale.

3. *The sheets are next fastened to bands*, which is done by taking the folded sheets up one by one, and sewing them to pieces of cord, stretched in a little frame screwed or fastened to the counter or table, called the sewing-press. (See eng.) The



number of bands used, is generally 6 for a folio, 5 for a quarto, and so on proportionally, less than 4 seldom being employed even for small sizes. The ends of the cords being cut off to within about 2 inches of the back, the sheets are ready for—

4. *Glueing.* The back being knocked into shape with a hammer, and the sheets placed in the cutting press, which is then slightly screwed up, melted glue is thinly and evenly applied. After a short time the book is removed from the press, and the back properly adjusted with a hammer, when it is again put into the cutting press, where it is screwed up very tight, and is then ready for—

5. *Cutting.* The instrument employed for this purpose is of a peculiar shape, and called a plough or plough-knife.

6. *Affixing the boards. The bands* are now scraped out fine at the ends, and the pasteboard to form the covers is fastened thereto, and is then properly adjusted, and shaped with a large pair of shears. The edges now undergo the operation of—

7. *Sprinkling*, or other adornment. The first is performed by a stiff brush of hog's bristles, dipped in the color; the brush being held in the one hand, and the hairs moved with the other.

8. *The external covering of leather, fancy cloth, or paper*, is now applied, having been previously well soaked in paste, to make it properly adhere. One or more of the blank leaves of the book are next pasted against the inside of the cover, to screen the ends that are turned over, when the book is finished; or for choice work, is handed to a "*finisher*" for—

9. *Lettering, gilding, &c.* Gold-leaf is applied by means of white of egg, the pattern being given by pressure with heated brass tools, having the design or letters on their surface. The whole is then glazed over and polished.

Remarks. The succession of some of the above operations sometimes varies with the workmen and

the nature of the binding. The above must therefore only be regarded as a short and general outline of the process. If the reader will accompany the perusal by an examination of a bound book, the whole will be rendered quite familiar.

The following varieties of binding may be noticed:

a. Boards. A book, loosely done up without cutting the edges, and covered with paper or cloth, is said to be in boards.

b. Cloth-binding. This style of binding is that in which the majority of works are now issued. It admits of great neatness and even beauty, and is very durable and cheap. *Proc.* The prepared cloth, cut by a pattern to the size suited to the volume, is passed rapidly through a rolling press, between engraved cylinders of hardened steel, which print the pattern in relief. Paste is now applied to the cloth, when it is placed over the volume, previously prepared to receive it. Books in cloth-binding are not commonly cut at the edges, unless highly finished.

c. Dutch binding. This species of binding is distinguished by the backs being of vellum.

d. French binding. This consists in pasting a piece of parchment over the back of the book, between each band, and pasting the ends upon the inside of each cover.

e. Half-binding. Books forwarded in boards, and finished with leather backs and corners, are called "*half-bound.*"

f. Hancock's patent binding. In this method the sheets are folded in double leaves, and being properly placed together and adjusted, the book is subjected to the action of a press, and a strong solution of Indian rubber is smeared over the back with the finger. The operation is repeated, as often as necessary, when fillets of cloth are cemented on with the varnish, and the book is ready to have the boards attached. Thus several of the common operations of binding are dispensed with. I willingly bear testimony to the strength and durability of this method, and the great convenience it affords in allowing the books to open perfectly flat upon a table, or to be distorted in any possible manner, without injury to their backs. It is the best way of binding books for travellers. I once had a large trunk of books, among which was one bound on Hancock's plan. All the rest were nearly torn to pieces by a few months' journey, but this one was uninjured.

g. Law binding. A strong method applied to law books.

h. Leather binding. *Proc.* Immerse the leather in water; after which wring it, and stretch it on a board; place the book with the boards extended thereon, and cut out the cover, allowing about half an inch larger than the book, to turn over the inside of the pasteboards. Pare the edges of the cover very thin all round on a marble slab, and paste it well; glue the back of the book, and spread the cover on the board.

Let the pasteboards be properly squared and even; put the book on the cover, which draw on very tight. Rub the cover smooth with a folding-stick, and turn it over on the inside of the pasteboards on the fore edge. The corners on the inside must be cut and neatly pressed down; tie a piece of thread round the book, between the boards and head-bands, draw up the leather on the back, if necessary, to cover the top of the head-bands; rub the back very smooth with a flat folding-stick, and place it at a distance from the fire to dry.

Rough calf must be damped on the grain side with a sponge and water before pasting and covering.

Russia leather must be well soaked in water fo an hour, taken out, well beaten, and rubbed; afte which the paste must be well worked into the flesh side before covering.

Morocco must be grained by rubbing it on a board, with the grain side inside, and after being pasted, left to soak for a quarter of an hour, and the cover then drawn on with a piece of woollen cloth to preserve the grain.

Roan may be either soaked in water or left to soak when pasted.

i. Italian binding. This is a common variety of binding employed in Italy, (hence its name,) in which the books are covered with a kind of thick coarse paper. In Italy it is called "*alla rustica.*"

k. Marble binding. Named from the design of the exterior.

l. Palmer's patent binding. This consists in applying small brass bars, linked together, to the back of the book, in such a manner that they make the different sections of the book, when open, parallel with each other, and thus admit of writing, without inconvenience, on the ruled lines near the back.

m. School binding. The following is a strong method for school books:—When the books have been cut, colored, and backed, cut off the part of the bands intended to be laced to the pasteboards, and glue on the back a piece of strong smooth linen cloth, which must reach within half an inch of the head and foot, turning on the sides about an inch; paste the boards on each side of the cloth, fixing them close in at the groove, and give the books a firm pressing in the standing-press till dry. Square the boards, glue the backs, and cover and finish in the usual manner.

This method will secure and give strength to the joints, so as effectually to prevent the leather from breaking, and require no more time than lacing in the bands. The edges may now be colored, sprinkled, or marbled, as required.

n. William's patent binding. This consists in placing a back, of a curved form, turned a little at the edges, and made of iron, copper, brass, wood, ivory, or any other material of sufficient firmness. This back is adjusted to the book before it is bound, in such a manner that it may just cover, but not press upon the edges, and is fastened on by enclosing it in vellum or ferret wrappers, which are pasted down upon the boards or drawn through them. The effect is, to make the book open evenly and freely, and to prevent it from spreading on either side.

BOOTS, TO CLEAN. To do this in the best style always use "boot-trees," employ but little blacking, and brush it off while damp. The dirt should, of course, be carefully brushed off before applying the blacking.

BOOTS AND SHOES, WATERPROOF COMPOSITION FOR. *Prep.* Boiled oil 1 pint; oil of turpentine, black rosin, and bees' wax, of each 3 oz. *Proc.* Melt the wax and rosin, then stir in the oil, remove the pot from the fire, and when it has cooled a little, add the turpentine.

II. Take 3 oz. of spermaceti, and melt it in a pipkin, or other earthen vessel, over a slow fire; add thereto 6 drachms of Indian rubber, cut into slices, and these will presently dissolve. Then add *seriatim* of tallow 8 oz.; hog's lard 2 oz.; amber varnish 4 oz. Mix, and it will be fit for use immediately. *App.* The boots or other material to be treated, are to receive two or three coats, with a common bladking brush, and a fine polish is the result.

BOOT-TOP LIQUID. *Prep.* I. Oxalic acid and white vitriol of each 1 oz.; water 1½ pints. *Proc.* Dissolve and apply with a sponge to the leather previously washed with water, then wash the composition off with water, and dry. This liquid is poisonous.

II. Mix in a vial, 1 drachm of oxymuriate of potass, with 2 oz. of distilled water; and when the salt is dissolved, add 2 oz. of muriatic acid. Then shake well together, mix in another vial 3 oz. of rectified spirit of wine with ½ an oz. of the essential oil of lemon, unite the contents of the two vials, and keep the liquid, thus prepared, closely corked for use. This liquid should be applied with a clean sponge, and dried in a gentle heat; after which, the boot-tops may be polished with a proper brush, so as to appear like new leather.

III. Sour milk 1 quart; gum arabic 1 oz.; juice of 2 lemons; white of 2 eggs; oil vitriol 2 oz. Mix.

IV. Sour milk 1 quart; butter of antimony, cream of tartar, tartaric acid, and burnt alum, of each 2 oz. Mix.

BORACIC ACID. *Syn.* SEDATIVE SALT. SED. SALT OF VITRIOL. SED. SALT OF HOMBERG. *Prep.* Dissolve borax in 4 times its weight of boiling water, then add sulphuric acid to the solution until it acquires a distinct acid reaction, (about ½ the weight of the borax.) As the solution cools, crystals of boracic acid will be deposited. These crystals must be then placed on a filter, and washed with a little cold water. They may be still further purified by solution in boiling water and recrystallization.

Remarks. Even after this treatment, the crystals are apt to retain a little sulphuric acid or sulphate of soda, which can only be got rid of by heating them in a platinum crucible, before redissolving them and crystallizing the second time, as above described. When wanted perfectly pure for chemical analyses, this plan must be always adopted.

The boracic acid of commerce is extracted from the acid lagoons of Tuscany.

Prep. As thus obtained, this acid is soluble in 25 times its weight of cold, and 3 times its weight of boiling water. Very soluble in alcohol, which then burns with a bright green flame, offering a sure test of the presence of boracic acid. Odorless, and tastes bitter. Reddens litmus, but browns turmeric paper. It was once administered internally in large doses, (by Cullen,) but is now scarcely ever employed as a medicine.

BORATE. A compound, formed of the preceding acid and one of the bases.

Prop. The boracic acid has but a feeble affinity for the bases; most of the borates being decomposed by the stronger acids, the former being liberated in a free state. *Prep.* Many of them may be formed by digestion of the hydrate of the base in a solution of the acid, with the assistance of heat, or by double decomposition.

Tests. I. By digestion in slight excess of oil of vitriol, evaporating to dryness, powdering, and dissolving in alcohol, the latter will acquire the property of burning with a green flame. II. If to a strong and a hot solution of a borate, sulphuric acid be added in excess, crystals of boracic acid will form as the liquor cools.

BORATE OF MERCURY. *Prep.* I. Neutral borate of soda 265 grs.; calomel 222 grs.; grind together in a mortar, with a little water, then fill the mortar up with hot water; collect the red precipitate; wash and dry.

II. Add a solution of borax to a solution of quicksilver in nitric acid. Collect the precipitate as before. (White.)

BORATE OF SODA. I. (*Neutral borate.*) *Prep.* Saturate boracic acid in solution with carbonate of soda, at a boiling heat. (Berzelius.)

II. (*Biborate.*) This salt, often erroneously called borate and subborate, is the borax of commerce, and is a natural production. (See BORAX.)

BORAX. *Syn.* BIBORATE OF SODA. BORATE OF SODA. SUBBORATE OF SODA. REFINED BORAX. Crude borax is a natural production, and after being refined, forms a large portion of the borax of commerce. In its rough state it is called *crude borax, tincal, tincar,* &c. It is found crystallized on the edges and shallows of a brackish lake in Thibet, during the winter. It is also prepared by saturating the native boracic acid of Tuscany with soda. The market being literally overloaded with the former article, its price has fallen so low as to allow of its employment for this purpose with great advantage. A valuable paper on this subject, by M. Payen, appeared in the "Ann. de Chimie et de Phys." for July, 1841; and a translation of the same in "The Chemist," vol. ii. 368, to which the reader is referred for a complete account of this process.

The best Tuscany boracic acid contains only 50 per cent. of real boracic acid, and yields no more than 140 to 150 per cent. of good borax.

Prop., Use, &c. It is extensively employed as a flux for metals, for soldering, and in medicine. Internally it is diuretic, sedative, emmenagogue, and cooling, in doses of 15 to 40 grains; externally as a gargle for sore throat, and in powder as a detergent in aphthæ, and ulcerations of the mouth. Dissolved in rose-water, it is used as a cosmetic, and mixed with 8 times its weight of lard, forms a useful piles ointment.

Tests. These are the same as for the borates, which see. It reddens turmeric paper, and, before the blowpipe, fuses into glass, which may be tinged red by terchloride of gold, and blue by cobalt.

Pur. The purity and strength of borax are best ascertained by determining the quantity of sulphuric acid required to neutralize a given weight, as indicated by litmus paper. Common salt and alum are frequently mixed with borax to lower the value. The former may be detected by dissolving the borax in hot water, when a solution of lunar caustic will give a curdy white precipitate, soluble in ammonia; and the latter by water of ammonia, which will give a bulky white precipitate. The

former must be distinguished from the white pulverulent precipitate of borate of silver, which will be thrown down from pure borax.

BORAX, GLASS OF. *Prep.* Dry borax with a gentle heat, breaking down the froth as it rises, then melt it by increasing the heat until it runs into a glass. *Use.* In soldering, and as a blowpipe flux.

BORO-FLUORIDE OF HYDROGEN.—*Prep.* Pass fluoboric acid gas through water, and afterwards carefully concentrate the solution; cool and separate the crystalline powder from the solution, which is the boro-fluoride of hydrogen. *Prop., &c.* With most of the protoxides it interchanges bases, and metallic boro-fluorides result.

BORO-FLUORIDE OF BARIUM. *Prep.* Add carbonate of baryta to boro-fluoride of hydrogen, until it ceases to be dissolved; evaporate to the consistence of a sirup, when crystals will form. *Remarks.* The boro-fluoride of calcium, magnesium, and lead, may be formed in a similar way.

BORO-FLUORIDE OF POTASSIUM.—*Prep.* Drop boro-fluoride of hydrogen into a solution of carbonate of potassa, collect the white powder that falls, and wash it with cold water.

BORO-FLUORIDE OF SODIUM. *Prep.* Dissolve fluoride of sodium in boro-fluoride of hydrogen, and crystallize. *Remarks.* Boro-fluoride of lithium may also be formed in a similar way.

BORON. The base of boracic acid, discovered by Sir H. Davy, in 1807, by means of the galvanic battery of the Royal Institute.

Prep. Potassium, and perfectly dry boracic acid, or still better, boro-fluate of potassa, intimately mixed together, are to be placed in an adopter, or glass tube, and submitted to a low red heat. When cool, remove the loose cork that fastened its mouth, and pour in successive portions of hot water, until the whole matter is detached and dissolved. Collect the liquid and allow it to settle, then wash the precipitate, first with a solution of sal ammoniac, and finally, with alcohol; next dry the boron in a capsule, and put it into a well-stopped vial.

Prop., &c. A solid, tasteless, and inodorous powder, of grayish-brown color. With sulphur it unites at high temperatures, forming sulphurets; and when placed in chlorine gas it spontaneously inflames, and a gaseous chloride is produced. This gas may also be made by exposing calcined borax and charcoal at a red heat to the action of dry chlorine.

BOTTLE, RED. *Syn.* TAYLOR'S RED BOTTLE. WHITWORTH DOCTOR'S RED BOTTLE. *Prep.* British brandy 1 quart; powdered cochineal ½ oz.; oil of origanum 10 drops. Digest for 24 hours and filter.

BOUGIE. *Syn.* CANDELA. CANDELA CEREA. CANDELULA. VIRGA CEREA. CEREA. CEREOLA. CEREUS. CEREOLUS. A long slender instrument, introduced into the urethra, œsophagus, or rectum, to overcome strictures of those canals. The word bougie is the French for a wax candle.

Prep. I. Add 3 parts of boiled linseed oil to 1 part of melted amber, and when mixed add 1 part of oil of turpentine; spread the mixture at 3 successive intervals upon loose spun silk cord or web, dry in a heat of 150°, and repeat the process until the instrument has acquired the proper size, then polish, first with pumice-stone, and afterwards with tripoli and oil.

Remarks. The above is the original receipt of the French professor Pickel, and is still generally used, slightly modified, on the continent.

II. Add to the oil and amber melted together, as last, caoutchouc in the proportion of $\frac{1}{20}$ of the weight of the oil employed; when dissolved, remove the vessel from the fire and proceed as before.

Remarks. This is the plan usually adopted at Paris, and for the best elastic bougies this process usually occupies from 6 to 8 weeks. When the bougie is wanted to be hollow, a piece of polished metallic wire is introduced into the axis of the silk, or tinfoil is rolled round the wire and the composition applied as before. When dry and hard the wire is withdrawn.

III. (*Caoutchouc, or elastic gum bougies.*) *a. In France* these are made by applying a solution of Indian rubber in ether, to the silk or foil prepared as above.

b. In England, where ether is expensive, naphtha is employed, or slips of Indian rubber previously boiled in water, or that have had their edges softened with ether, are wound round the wire or foil, and kept in their place by a piece of tape applied over them, as in making elastic tubes. They are afterwards carefully smoothed off.

IV. A common kind of bougie is made by dipping pieces of catgut or soft linen into lead plaster, melted, and rolling it while yet warm upon a slab. *Very inferior.*

V. (*White.*) *Prep.* Yellow wax 1 lb.; spermaceti 1 oz.; finely-powdered sugar of lead ¾ oz.; melt and spread upon slips of old linen, then roll them up while warm with the spread side outwards.

VI. (*Bell's.*) Lead plaster 1 lb.; yellow wax 8 oz.; olive oil 2 oz.; *as last. Very inferior.*

BOUILLI. (French for boiled meat.) This name has been applied by cooks to several dishes of boiled meat, as a refinement on the plain English. Thus "beef bouilli, beef in bouilli, &c.," means, stewed or boiled beef, &c. As, however, the name is à la français, so must be the accompaniments, which generally consist of herbs and vegetable seasoning in greater quantity and variety than is usually deemed essential to a plain-spoken piece of boiled or stewed meat!

BOULES DE NANCY. Equal parts of iron filings and red tartar, made up into balls with spirit. *Use.* As a tonic dissolved in hot water.

BOUQUET DE LA REINE. *Prep.* I. Essence of bergamotte 1 drachm; English oil of lavender 23 drops; oil of cloves and aromatic vinegar, of each 8 drops; essence of musk 10 drops; alcohol ½ oz. Mix.

II. Oils of bergamotte and lavender 30 drops each; neroli 15 drops; oils of verbena and cloves, of each 5 drops. Essences of musk, ambergris, and jasmin, of each ½ drachm; rectified spirit of wine (strongest) 1 oz. Mix.

BOX WOOD MAHOGANY. *Prep.* Warm the wood by the fire, then wash it over with aquafortis, let it stand 24 hours to dry, and polish it with linseed oil reddened with alkanet root, or give it a coat of varnish, made by dissolving aloes and annotto in spirit of wine.

BOYLE'S FUMING LIQUOR. Hydrosulphuret of ammonia is usually employed and sold for this article, but the liquor prepared by Boyle's process contains an excess of sulphur. (Gay Lussac.) The properties of both are however the same.

Prep. Mix 4 parts of fresh slaked lime; 2 of sal ammoniac, and 1 of sulphur, then submit the mixture to distillation.

BRA GRAS. Tar, black rosin, and the dregs of strained rosin, melted together.

BRAIN CAKES. *Prep.* Clean, wash, blanch, and soak the brains, then beat them up with a little white pepper and salt, a sage-leaf or two, scalded and finely chopped, and the yelk of an egg; make them into small cakes or fritters, and fry them.

BRAN. The husk of wheat which immediately covers the grain, and which is left in the bolting machine. *Use.* It is largely employed by the calico printers, when diffused through hot water, to remove the coloring matter from those parts of their goods which are not mordanted. A handful mixed with a pail of warm water, forms an excellent emollient foot-bath. Infused in water, (*bran tea,*) and sweetened, it forms a popular demulcent, much used in coughs and hoarseness, and, taken in quantity, proves gently laxative. It also forms an excellent manure, and, from containing the ammoniaco-magnesian phosphate, is especially adapted for potatoes. It is frequently mixed with flour and made into bread, by the poorer orders.

BRANDY. *Syn.* Eau de Vie. Aqua Vitæ. Spiritus Gallicus. Brandy-wine. The spirituous liquor obtained by the distillation of wine. When first distilled it is colorless, and only acquires a yellowish tint from the wood of the casks, in which state it is known and sold as pale or white brandy. The deep color that it usually possesses, is imparted to it by adding a little spirit coloring, (burnt sugar or caramel,) and occasionally a little red sanders wood as well, and is intended to imitate the appearance acquired by brandy from great age, when kept in wood. The natural color, however, which the spirit receives from the cask, no matter how long it may have been in it, never exceeds an amber tint, about the common color of pale Jamaica rum; but the public taste has been gradually vitiated in this respect, until only a spirit of a lively and full "*brandy color*" (unless for a pale brandy) will sell.

The brandies most esteemed in England are imported from France, and are those of Cognac and Armagnac, the preference being generally given to the former. The brandies of Rochelle and Bordeaux may be reckoned next in quality, while those obtained from Portugal, Spain, and Italy are very inferior.

The constituents of brandy are alcohol and water, and small quantities of volatile oil, acetic acid, acetic ether, œnanthic ether, coloring matter, and tannin. It is from the presence of the last six of these substances that the spirit derives its distinguishing smell and flavor. The quantity of alcohol present in brandy varies from 48 to 55 per cent. When first imported, it is generally 1 or 2 overproof, but by age its strength is lessened, and by the time it is usually taken from the bond store for sale, seldom exceeds 3 or 4 underproof. From considerable personal acquaintance with the cognac trade, I feel confidence in asserting, that brandies of the best quality seldom exceed proof, and are generally below it, and that it is a common practice in France to add spirit of wine and coloring to raise the strength to any given point desired by the English purchaser, and to charge the same in the invoice; or where the purchaser is not *well acquainted with the subject,* and desires a strong spirit at a low rate; to sell him brandy so mixed as genuine. The very finest brandies average from 5 to 10 u. p., and never exceed about 2 u. p.; they then contain more than ½ their weight of water, and from their boiling point being higher, they come over more highly charged with essential oil, and other volatile and fragrant principles of the grape, and thus possess in a greater degree that peculiar aroma and flavor for which they are so much esteemed. French brandy or wine, distilled at a low temperature in a water bath, yields a very pure and scarcely flavored spirit.

The quality of the brandy imported from France varies considerably from that which is drunk on the continent, principally from its being *prepared,* or, as it is technically termed, "*made up,*" for the London market, which means lowering it by the addition of spirit, coloring, &c. above described. The common strength at which foreign brandy is sold in England is about 11 or 12 u. p., and below 17 u. p. it becomes seizable by the excise. The strength at which it is sold and permitted in trade, is generally 10 u. p., to which it is reduced by adding water, and never less than 12 u. p., unless it be specially agreed upon. In large quantities and from bond, of course the strength depends much upon the age and quality of the spirit. A fine old brandy being, perhaps, 8 or 10 *u. p.*, while one of the last year's vintage of a commoner quality may be as strong as 2 or 1 *u. p.* But these distinctions are familiar to every experienced brandy dealer.

In France there are several varieties of this spirit distilled, which are known by names descriptive both of their quality and source. The "*eau de vie supérieure,*" or *cognac brandy,* is generally obtained from pale white wines, by careful distillation, and is remarkable for its superior flavor. When kept in glass or stone bottles, it is called white cognac brandy, and the same term is also generally applied when it has been kept in casks, but has not been artificially colored; in the latter case, however, it generally acquires a pale amber tint.

The "*eau de vie ordinaire,*" or *common brandy,* is distilled from high-colored white or red wines, and has generally a sp. gr. of 0·948, and varies from 22 to 27 u. p.

The "*eau de vie de marc*" is obtained from the lees of vinegar and other wines, the marc or cake of grapes from which the juice has been pressed, and the commonest red wines, fermented and distilled together by a quick fire, to drive over as much essential oil and flavoring as possible.

The "*eau de vie seconde*" is the weak spirit that passes over after the stronger spirit has been drawn off, and the receiver changed. *It is used* for common drinking, or mixed with other brandy.

The "*eau de vie à preuve d'Hollande*" is brandy about 19° Baume, or sp. gr. ·9420, the common strength at which it is retailed in France, and will stand the "*proof*" or "*bead*"

The "*eau de vie à preuve d'huile*" is the strongest brandy usually drunk; it is about 23° Baume, or sp. gr. ·918; pure olive oil will just sink in it; hence the above term.

The "*eau de vie fort*" is usually prepared by the redistillation of common brandy, keeping the first portion separate. It answers to our spirit of wine. It is made of 12 different strengths, distinguished by names, exhibiting the quantity of water required to reduce the sample to the "*preuve d'Hollande*." The weakest is called cinq-six, or $\frac{5}{6}$, and the strongest trois-neuf, or $\frac{3}{9}$, the difference between the numerator and the denominator being the quantity of water the 3 parts of the former will take to reduce it to the "*preuve*," when it would make 9 parts. Its sp. gr. is about ·839.

The *esprit de vin* is brandy or spirit rectified to 0·890 and upwards.

The general method of distilling brandy in France differs in no important particular from that practised in England, for grain or molasses spirit. Neither are the French workmen more skilful nor more cleanly in their operations than the English. It is the materials alone that, in this case, conduce to the superiority of the product. The quality of the brandy varies with that of the wine from which it has been distilled. Every soil, every climate, every kind of grape, produces a wine possessing some peculiarity confined to itself, and this wine on distillation produces a spirit possessing like distinctions. A large quantity of brandy is prepared in France soon after the vintage, as the juice of the poorer grapes that is unfit for wine is fermented and at once distilled. It is a general rule, in France, to distil only such wines as are unsaleable, as the profits on the wine, sold as such, are much greater than when it is converted into brandy.

The Strength of Brandy may be ascertained in the same way as alcohol, for which purpose Sike's hydrometer is used in England. In France, from the value of spirit being less, it is frequently tested by simpler methods, though great accuracy obtains, in this particular, where necessary.

Pur. Very little perfectly pure French brandy is obtained by the small consumer in England, as it is not only generally lowered a little by the wholesale dealer, but undergoes a like process at the hands of the retailer. The safest method is either to procure it direct from the bond store, without its even entering a private cellar, or to buy of some known respectable party, and to pay a price that will offer no inducement to dishonesty. If this be not done, by all means buy British brandy, which is now made of excellent quality by many of the leading houses, as *Betts, Bretts, Booth*, and *Grimble*. From the two former a single sealed bottle may be procured at the same price as by the gallon.

The importation of foreign brandy for home consumption amounts to about 1,400,000 gallons a year.

BRANDY, (REDUCED.) I. To 20 gallons of Cognac brandy add 5 gallons of the best British brandy.

II. To 72 gallons of full-flavored French brandy, add 10 gallons of spirit of wine, (58 *o. p.*,) 8 gallons of water, and 1 pint of good coloring. Rummage well up and let it stand until the next day.

Remarks. The above reduction is generally adopted in trade, and is known by the name of "*improving*." But such is the poverty of the palate of the English brandy drinker, that the adulteration is often not suspected, even when it is carried to double the extent of the above, which is generally exceeded in the hands of the retailer. So long, however, as the foreign spirit constitutes about half of the mixture, and was at first of decent quality and age, the infatuated Englishman smacks his lips, and cunningly holding up his glass between the light and his eye, exclaims, "*Ah! this is a drop of the real.*"

BRANDY, (BRITISH.) *Syn.* British Cognac. Imitation Cognac, &c. From the heavy duty levied on French brandy imported into England for home consumption, it has become a desideratum with the distiller (rectifier) to produce an English spirit of a similar description. For some time the attempt proved quite unsuccessful, but of late years much capital and talent have been embarked in the pursuit, and the result has proved very satisfactory. An article of British manufacture may now be purchased, at a very reasonable rate, of really respectable quality, and possessing much of the flavor and aroma of foreign brandy, while, as a beverage, it is equally wholesome. Much of the British brandy, however, that is commonly met with, is of such a wretched quality as to be quite undeserving of the name, which is evidence of the fact, that much skill and experience is required to ensure success in its manufacture. For a long time this liquor was distilled from spoilt wine and dregs of wine, both British and foreign, mixed with beer bottoms and similar articles; and when, instead of these, corn, malt, and molasses spirit were employed, it was considered as an unpardonable and wicked misuse of those articles. Modern experience has proved, however, that perfectly pure and tasteless malt spirit is the best article to form into an imitation brandy.

The following formulæ, by skilful management, will produce very good brandy, but it must be recollected that much depends on the quality of the materials employed, as well as on the operator. As the strength and quality of the ingredients, and the methods of manipulation vary, so will the result; much must therefore be left to the judgment and discretion of the artist. It offers a profitable pursuit to the ingenious and industrious chemist and rectifier.

Prep. I. Take 12 gallons of the finest flavorless malt spirit at proof, (or if of a different strength a proportionate quantity;) add thereto 5 gallons of water, $\frac{3}{4}$ lb. of the best crude red tartar or winestone, previously dissolved in 1 gallon of boiling water; $\frac{1}{4}$ pint of acetic ether; 2 quarts of good French wine vinegar; 7 lbs. of bruised French plums, and 1 or 2 gallons of wine bottoms or flavor stuff from Cognac, mix them in a fresh-emptied sherry cask, and let them stand together for 14 days, frequently rummaging up the liquor with a stick; next draw over 15 gallons of the mixture from a still furnished with an agitator. Put the rectified spirit into a clean, fresh-emptied Cognac brandy cask, and add thereto $\frac{3}{4}$ pint of tincture of catechu, 1 lb. of fresh and clean oak shavings, and about a pint of good spirit coloring. Bung close, and agitate occasionally for a few days. *Remarks.* Age improves the above article, and renders it

(provided the process be well managed) of a very superior quality. The above receipt yields 15 gallons of brandy 17 *u. p.* The following forms may also be recommended:—

II. Perfectly pure spirit, pf. 99 gallons; red tartar, dissolved, 7 lbs.; acetic ether 3 lbs.; wine vinegar 3 gallons; bruised raisins, or French plums, 7 lbs.; bitter almonds, bruised, 1 oz.; water sufficient. Dissolve the tartar in the water, then add the other ingredients, macerate as before, and draw over 120 gallons; lastly, add a few lbs. of oak shavings, 1 lb. of powdered catechu made into a paste with water and burnt-sugar coloring as before. *Remarks.* This yields 120 gallons of spirit fully 17 *u. p.*

III. Clean spirit 17 *u. p.*, 100 gallons; nitric ether 2 quarts; cassia buds, ground, 4 oz.; bitter almond meal 2 oz.; orris root, sliced, 6 oz.; powdered cloves 1 oz.; capsicum 1½ oz.; good vinegar 2 gallons; brandy coloring 1 quart; powdered catechu 1 lb.; full-flavored Jamaica rum 2 gallons. Mix well in an empty Cognac cask, and let them macerate for a fortnight, occasionally stirring. *Remarks.* The proportion of the ingredients may be varied by the skilful brewer, as much depends on their respective strengths.

IV. Good plain malt spirit, 17 *u. p.*, 100 gallons; finely-powdered catechu 12 oz.; tincture of vanilla 4 oz.; burnt-sugar coloring 1 quart; good rum 3 gallons, or more; acetic or nitric ether 2 quarts. Mix well.

V. Clean spirit, 17 *u. p.*, 89 gallons; high-flavored cognac 10 gallons; oil of cassia 1½ drachms; oil of bitter almonds, essential, ½ a drachm; powdered catechu 10 oz.; cream of tartar, dissolved, 16 oz.; Beaufoy's concentrated acetic acid 3 lbs.; sugar coloring 1 quart, or more; good rum 1 gallon. Put the whole into a fresh emptied brandy piece, and let them remain a week together, with occasional agitation, then let them stand to settle. If this mixture be distilled, the French brandy, rum, coloring, and catechu, should not be added till afterwards.

VI. To colored plain spirit at 17 *u. p.*, add a little tincture of catechu, and a sufficient quantity of essential oil, distilled from wine lees, to give it a proper flavor. This oil is obtained by distillation from the wine lees, either dried and made up into cakes, or in their wet state mixed with about 7 times their weight of water. It should be dissolved in alcohol, and kept in this state, as it is apt to lose its flavor. *Remarks.* When this process is well managed a very capital article results, but it requires considerable address to conduct it well. The spirit produced by this plan is better for distillation. The brandy from any part of the world may thus be imitated, by distilling the oil from the lees of the wines produced in the particular district. This is the only method of producing an exact imitation. A pound each of finely-powdered charcoal and ground rice has been recommended to be digested in a gallon of spirit for a fortnight. Where black tea is cheap, as in America, it is very commonly employed to impart the roughness and flavor of brandy to colored spirits.

BRANDY, CHERRY. *Prep.* I. To every gallon of brandy put an equal measure of cherries, bruised between the fingers; steep for 3 days, then express the liquor; add 2 lbs. of lump sugar, and strain for use.

II. To the above add 1 quart of raspberries, and ½ a pint of orange-flower water. *** Quality very fine.

III. Treacle 1 cwt.; spirit (45 u.p.) 41 gallons; bruised bitter almonds (more or less, to taste) 5 oz.; cloves 1 oz.; cassia 2 oz. Put the ingredients into a large cask, well mix and let them lie a month, occasionally stirring.

Remarks. Equal parts of fully ripe Morello and black cherries produce the richest cordial.

BRANDY, CARAWAY. *Prep.* I. Steep 4 oz. of bruised caraway seeds and 2 lbs. of sugar in 1 gallon of British brandy, for a fortnight.

II. Sugar 1 lb.; caraways 1 oz.; 3 bitter almonds; spirits of wine and water, of each 1 quart; (or spirit 22 u.p. ½ a gallon.) Macerate as above.

BRANDY, DANTZIC. This is distilled from rye, ground with the root of calamus aromaticus. It has a mixed flavor of orrice and cinnamon.

BRANDY, LEMON. *Prep.* I. Steep ¼ lb. of fresh lemon peel and ½ a dozen lemons, cut in slices, in 1 gallon of brandy, for a week, then add 1 lb. of lump sugar.

II. Proof spirit 7 gallons; essence of lemon 3 drachms; sugar 5 lbs.; tartaric acid 1 oz., dissolved in water 2 gallons; coloring q. s. Mix, and rummage repeatedly for 14 days. *Remarks.* Sometimes milk is added to the above, in the proportion of 1 quart (boiling hot) to every gallon.

BRANDY, MALT. Malt spirit, flavored with sweet spirits of nitre and terra Japonica, and colored with treacle, or spirit coloring. (See BRIT BRANDY.)

BRANDY, ORANGE. This may be made in a similar way to lemon brandy.

BRANDY, PEACH. *Prep.* I. From peaches, by fermentation and distillation. Much used in the United States, where peaches are very cheap.

II. Bruise the peaches, then steep them in twice their weight of British brandy, or malt spirit; lastly, express the liquor.

III. Bitter almonds (bruised) 2 oz.; proof spirit (light) 10 gallons; water 3 gallons; sugar 5 or 6 lbs.; orange-flower water ½ a pint. Mix, and macerate for 14 days.

*** Color with brandy coloring, if *required* darker.

BRANDY, RASPBERRY. *Prep.* I. Pour as much brandy over raspberries as will just cover them; let it stand for 24 hours, then drain it off, and replace it with a like quantity of fresh spirit; after 24 hours more, drain this off and replace it with water; lastly, drain well, and press the raspberries quite dry. Next add sugar to the mixed liquors, in the proportion of 2 lbs. to every gallon, along with a ¼ of a pint of orange-flower water.

II. Mix equal parts of mashed raspberries and brandy together, let them stand for 24 hours, then press out the liquor. Sweeten as above, and add a little cinnamon and cloves, if agreeable; lastly, strain.

BRASS. An alloy of copper and zinc.

Hist. and Prep. Brass was formerly manufactured by cementing granulated copper, or copper clippings, with calcined calamine and charcoal, in crucibles, exposed to a bright heat. The alloy

was found in lumps at the bottom of the crucible on cooling. These were remelted and cast into ingots. At the present day, brass is generally made by direct union of the metals. This process requires much care, owing to the different degrees of fusibility of copper and zinc. The proper quantity of zinc is first melted, and slips of copper plunged into it, which are rapidly dissolved, as it were, and the addition is continued until an alloy is formed, somewhat difficult of fusion, when the remainder of the copper is added. The brass thus formed is broken into pieces, and remelted under charcoal, and a proper addition of either zinc or copper made, to bring it up to the color and quality desired. It is next cast into plates, or other forms, in moulds of granite. When submitted to the rolling-press for reduction to *thin* plates, it requires to undergo the operation of annealing several times.

Prep. I. (*Fine Brass.*) 2 parts of copper to 1 part of zinc. *Remarks.* This is nearly 1 equivalent each of copper and zinc, if the equivalent of the former metal be taken at 63·2; or 2 equivalents of copper to 1 equivalent of zinc, if it be taken, with Liebig and Berzelius, at 31·6.

II. Copper 4 parts, zinc 1 part. An excellent and very useful brass.

III. (*Gold-colored Brass.*) *Syn.* Red Brass. Dutch Gold. Tombac. Similor. Prince's Metal. Pinchbeck, &c.

a. Copper and zinc, equal parts.

b. Copper 2 parts; zinc 1 or 1½ parts. This is Manheim gold.

c. Copper 3 to 5½ parts; zinc 1 part. Deep colored.

Remarks. The proportion of zinc in this alloy is altered to suit the color and other properties to the purposes for which it is intended, and often varies from ⅓ to ½, or ⅙ of the weight of the alloy. At the celebrated works of Hegermühl, near Potsdam, the proportions are 11 parts of copper to *two* of zinc, which produces a metal which is afterwards rolled into sheets for the purpose of making Dutch leaf-gold.

BRASS, BUTTON. (*Best.*) I. Copper 8 parts; zinc 5 parts, as above.

II. (*Common.*) Copper 50 parts; zinc 40 parts; tin 4 parts; lead 6 parts.

BRASS, FOR SOLDER. *Syn.* Hard Solder. I. 12 parts of brass; 6 parts of zinc, and 1 of tin, melted together.

II. 2 parts of brass, and 1 of zinc.

III. (*Very strong.*) 3 parts of brass, and 1 of zinc.

BRASS, TURNER'S. 98 parts of brass, and 2 of lead. *Remarks.* The addition of lead improves the brass for the uses of the turner, but lessens its malleability.

BRASS, CLEANING OF. Brass and copper are best cleaned with sweet oil and tripoli, powdered bath-brick, rotten-stone, or red brick-dust, rubbed on with flannel and polished with leather. A strong solution of oxalic acid in water gives brass a fine color. Vitriol and spirits of salts make brass and copper very bright, but they very soon tarnish, and consequently require more frequent cleaning. A strong lye of roche-alum and water will also improve brass.

Brass inlaid work may be cleaned as follows:—Mix tripoli and linseed oil, and dip into it a rubber of hat, with which polish the work. If the wood be ebony or rosewood, polish it with a little finely-powdered elder-ashes; or make a paste of rotten-stone, a little starch, sweet-oil, and oxalic acid, mixed with water. The ornaments of a French clock are, however, best cleaned with bread-crumb, carefully rubbed, so as not to spoil the woodwork. Ormolu candlesticks, lamps, and branches, may be cleaned with soap and water. They will bear more cleaning than lacquered articles, which are spoiled by frequent rubbing, or by acids, or strong alkalis.

BRASS COATING. I. Brass plates and rods may be covered with a superficial coating of brass, by exposing them in a heated state to the fumes of melted zinc, at a high temperature. *Use.* For rolling into thin plates, or drawing into wire. The celebrated spurious gold wire of Lyons is thus made.

II. Vessels of copper may be coated with brass, internally, by filling them with water strongly acidulated with muriatic acid, adding some amalgam of zinc and cream of tartar, and then boiling for a short time.

BRASS-COLORED PIGMENT. *Syn.* Brass Bronze. *Prep.* I. (*Red.*) Grind copper filings, or precipitated powder of copper, with a little red ochre.

II. (*Yellow or gold-colored.*) Gold-colored brass, or Dutch leaf reduced to a very fine powder.

Remarks. Both these powders are mixed up with varnish, and used as a paint. No more should be mixed at a time than wanted for immediate use. They are also used by dusting them over any surface, previously covered with varnish to make them adhere. (See Oxide of Copper.)

BRASS-COLORED VARNISH. *Prep.* Dissolve 1 oz. each of pale shell lac and gum sandarach, in ½ a pint of rectified spirit of wine.

Use. To mix up the preceding powders.

BRASS, PASTE FOR CLEANING. *Prep.* I. Soft soap 2 oz., rotten-stone 4 oz.; beat them to a paste.

II. Rotten-stone made into a paste with sweet oil.

III. Rotten-stone 4 oz.; oxalic acid 1 oz.; sweet oil 1½ oz.; turpentine enough to make a paste.

Use. To clean brass. The first and last are best applied with a little water. The second, with a little spirits of turpentine, or sweet oil. Both require friction with soft leather.

BRASS ORNAMENTS, PRESERVATION OF. Brass ornaments, when not gilt or lacquered, may be cleansed, and a fine color given to them by two simple processes. The first is to beat sal ammoniac into a fine powder, then to moisten it with soft water, rubbing it on the ornaments, which must be afterwards rubbed dry with bran and whiting. The second is to wash the brass-work with roche alum boiled to a strong lye, in the proportion of an ounce to a pint; when dry, it must be rubbed with fine tripoli. Either of these processes will give to brass the brilliancy of gold.

BRASS STAIN. I. Cut sheet-brass into small pieces, and expose it to a strong heat for 2 or 3 days, then powder it, and again expose it for several days to a like heat; again powder and sift,

and expose it a third time to heat, testing it occasionally, to see if it be properly burnt. When this is the case, a little of it fused with glass will make the latter swell and froth up.

Uses, &c It imparts to glass a green tint, passing into torquoise.

II. Calcine equal parts of plate-brass and sulphur, stratified together in a crucible, until they become friable; then powder and expose them again, as last.

Use. Imparts a calcedony red or yellow tinge to glass by fusion, according to the mode of using it.

BRAWN, CHOICE. When young, the horny parts feel moderately tender; if the rind be hard, it is old.

BRAWN, MOCK. *Prep.* Take the head and belly piece of a young porker, well saltpetred; split the head and boil it; take out the bones and cut it to pieces; then take four ox-feet boiled tender, and cut them in thin pieces; lay them in the belly piece, with the head cut small; roll it up tight with sheet tin, and boil it four or five hours. When it comes out, set it up on one end, put a trencher on it within the tin, press it down with a large weight, and let it stand all night. The next morning take it out of the tin, and bind it with a fillet, put it into cold salt and water, and it will be fit for use; it will keep a long time, if fresh salt and water are put into it every four days.

BRAZIL WOOD. *Syn.* Sapan Wood. Saint Martha Wood. Fernambuca. This wood is much used in dyeing. A decoction is made by boiling for some hours in hard spring water, and this is generally kept for some time, or until it undergoes a species of fermentation, as it is thus found to yield more permanent and beautiful colors than when employed quite new. *Use.* To dye *red.*

BRAZIL WOOD DYE. I. (*For cotton and linen.*) *a.* First boil the goods in a bath of sumach, next work them through a weak mordant of solution of tin, and then run them through the Brazil bath, lukewarm. This gives a bright red.

b. First alum the goods and rinse them, then give them a mordant of solution of tin, rinse again, and turn them through the dye-bath. This gives a rose color.

Remarks. The shades of this dye may be varied by the strength of the bath, mordant, &c. A little alum added to the Brazil-bath, gives a purple tint. 1 lb. of Brazil wood, ½ oz. of alum, and 2 oz. of tartar will dye 20 to 25 lbs. of cotton.

II. (*For silk.*) The silk, after being well alumed in the same way as wool, but at a lower temperature, is rinsed, and passed through the decoction of Brazil, just lukewarm.

Remarks. By adding a little alkali to the bath, or by passing the silk through a water holding a little alkali in solution, after it is dyed, will produce what is called the false crimson. When wanted of a very deep crimson, a little logwood is added to the Brazil-bath. In this way any shade of color may be produced.

III. (*For wool.*) Boil the wool in water holding in solution 5 parts of alum and 1 of tartar, for 1 hour; then let it lie in the cold liquor for several days, frequently moving it about; lastly, boil it in a decoction of Brazil for ½ an hour.

BRAZILINE. *Syn.* Brezilinе. The coloring principle of Brazil wood, obtained by Chevreul in small orange-colored needles. It is soluble in both water and alcohol; alkalis turn it violet, acids yellow. With alum it dyes red.

BRAZING. The operation of uniting the edges of pieces of copper, brass, iron, &c., by means of hard solder.

Proc. The edges, after being filed quite clean, are covered with a mixture of hard solder and powdered borax, made into a paste with water. The whole is then allowed to dry, and afterwards exposed in a clear fire to a heat sufficient to melt the solder.

Remarks. In some cases a little silver is added to the solder, when it receives the name of "*silver solder.*"

BREAD. *Principles of bread-making, &c.* This most important article of food is made of the flour of different grains, but only those that contain gluten admit of conversion into light spongy bread. Hence it is that wheat flour is best calculated for this purpose. When flour is made into a stiff paste or dough with water, and rolled into cakes and baked, it forms biscuits, or unleavened bread, which was once the only description known. When the dough, previously to baking, is left for some time in a moderately warm place, varying from 80° to 120°, a state of fermentation comes on, formerly called the panary fermentation, but which is, in reality, the sugar of the flour gradually undergoing the process of conversion into alcohol, and resembles in every respect the same change which takes place in the manufacture of wine, beer, &c. During this process, a large quantity of carbonic acid gas is liberated, and the toughness of the dough preventing its escape, the whole mass becomes puffed up and spongy, and a light porous paste is formed, ready for baking into bread. The natural process of fermenting the dough just described, is, however, subject to much uncertainty, and is inconvenient from the time it occupies to complete it, and the tendency the dough has to run into the acetous fermentation, when it acquires a sour and disagreeable taste, and is rendered less nutritious and easy of digestion. This has led to the use of a *ferment*, which at once excites a proper state of fermentation throughout the mass, and speedily renders it light and spongy. *Leaven* or *dough*, already in a state of fermentation, was originally employed for this purpose, and the bread so made was hence called *leavened bread.* But this has been wholly superseded by barm or yeast. Thus it will be seen that all that is essential to make a loaf of bread, is to add a proper quantity of yeast to the dough, and to allow it to remain for a short time in a warm place, until it rises or becomes spongy, when it must be subjected to the operation of baking. If the process be well managed, and the flour be good, bread of superior quality will be produced.

Process of making bread. In preparing his dough, the modern baker takes a part of the water needed for the batch, and having warmed it to a temperature of about 80° or 90°, dissolves his salt therein, and then adds the yeast and a portion of the flour. These he works up into a dough, which he sets aside in a warm place usually provided for

the purpose, and called the "*kneading trough*," where it soon begins to ferment and swell up. This process is called "*setting the sponge*," and according to the proportion the water in it bears to the whole quantity that is to be used, it receives the name of "*whole*," "*half*," or "*quarter sponge*." The evolution of carbonic acid in the process of fermentation, causes the sponge to heave and swell, and when the surface bursts, it subsides, and then swells again and again in a similar manner. This action would go on for some time, if not interfered with; but the baker is careful to stop it before it has communicated a sourness to the mass. After the *first*, or at the *furthest*, after the second or *third* "*dropping of the sponge*," he adds the remaining quantity of flour, water, and salt, necessary to form the batch. These he incorporates by long and laborious kneadings, until the entire mass acquires uniformity, and is sufficiently tough and elastic to bear the pressure of the hand without adhering to it. The dough is now left to itself for a few hours, during which time fermentation goes on, after which the inflated mass is again kneaded, when it is ready to be cut into pieces and weighed. These pieces are then shaped into loaves, and set aside for an hour or two, during which time they swell up to nearly double their former size; they are then placed in the oven and baked. During this operation they continue for a time to increase in size, in consequence of the dilation of the pent-up gas by the heat of the oven, until at length the fermentation is checked, and the dough becomes too solid to admit of further alteration.

Remarks. A number of other processes are used by cooks and confectioners to make the different varieties of fancy bread, cakes, puddings, &c., most of which vary according to the peculiar characteristic it is desired to communicate to them. Thus some kinds of cakes and pastes are made to eat "*short*," as it is called, or are rendered less tenacious, and a species of brittleness imparted to them by the addition of starch and sugar. In pastry a similar effect and peculiar lightness is produced by butter or lard, while in some articles, white of egg, gum-water, isinglass, and other adhesive substances are added to produce an exceedingly light and porous mass.

The different varieties of bread made in England vary chiefly in their quality, according to the flour of which they are formed. *The best white bread* is made from the purest wheat flour; *ordinary wheaten bread*, of flour to which a little of the finest bran has been added; *seconds*, from flour containing a still larger portion of bran; and common household bread, from flour produced by grinding the whole substance of the grain without any separation of the bran. Symnel bread, manchet or roll bread, and French bread are varieties made of the purest flour, from the finest wheat, a little milk being usually added for rolls, and butter and eggs for choicer purposes. Several other minor kinds of bread are also made, varied by the addition of sundry trifles, as sugar, currants, and other palatable ingredients. The Scotch "short bread" is made from a *very thick dough*, to which butter, sugar, orange-peel, and spices, are added. (See GINGERBREAD.)

In France a number of different kinds of bread are made. The "*pain bis*" is the coarsest sort, and is made of a mixture of groats and wheat flour; the "*pain bis blanc*" is made of a mixture of oatmeal and wheat flour; the "*pain blanc*" of flour from which the finest portion has been sifted; the "*pain mollet*," or soft bread, is made of the purest wheat flour, from the finest grain; the "*pain chaland*," made from the same materials as the last, but the paste is pounded; the "*pain chapalé*" is a small variety of bread, similar to the French or roll bread of England; the "*pain cornu*" is a kind of small bread, named from being done up into four-cornered pieces; the "*pain de la reine*" is another variety of small bread, and the "*pain gruau*" is a bread which has been made of late years in Paris, prepared from the small granular particles separated from the best wheat after a slight grinding. The French have also their soup bread and their country white bread, besides several other varieties, not mentioned in the above list.

In the manufacture of white bread from damaged or inferior flour, a large quantity of alum is employed by the bakers, but with the best flour no alum is required. The utmost beauty, sponginess, and sweetness, may be given to bread without the addition of one particle of alum, provided the best materials are employed. As such is not, however, generally the case, it is a common practice with the bakers to introduce 4 or 5 oz. of alum to every sack of flour, or about 1 oz. to each bushel. The method of detecting this adulteration will be presently explained. The proper quantity of salt to be used is 6 or 7 lbs. to the sack, or 1¼ lbs. to the bushel. 1 sack of the best flour, and 6 lbs. of salt, ought to yield about 360 lbs. of *good bread*, and a sack of seconds 345 to 350 lbs. of bread.

Wheaten bread, made of pure materials, is one of the most wholesome articles of food, and has been justly termed the staff of life. When well fermented and baked, it is very easy of digestion. It should never be eaten till it has stood 24 hours after being taken out of the oven, as newer bread is apt to disagree with the stomach, frequently producing flatulence, heartburn, and indigestion.

Adult. This is often carried to a fearful extent: Mr. Accum says, "The bakers' flour is very often made of the worst kinds of damaged foreign wheat, and other cereal grains mixed with them in grinding the wheat into flour. In this capital, no fewer than six distinct kinds of wheaten flour are brought into the market. They are called fine flour, seconds, middlings, fine middlings, coarse middlings, and twenty-penny flour. Common garden beans and peas are also frequently ground up among the London bread flour.

"The smallest quantity of alum that can be employed with effect to produce a white, light, and porous bread, from an inferior kind of flour, I have my own baker's authority to state, is from 3 to 4 oz. to a sack of flour weighing 240 lbs."

"The following account of making a sack of five bushels of flour into bread, is taken from Dr. P. Markham's 'Considerations on the Ingredients used in the Adulteration of Flour and Bread,' (p. 21:) 5 bushels of flour; 8 oz. of alum; 4 lbs. of salt; ½ gallon of yeast, mixed with about 3 gallons of water.

"Another substance employed by fraudulent

bakers is subcarbonate of ammonia. With this salt they realize the important consideration of producing light and porous bread from spoiled, or, what is technically called, *sour flour*. This salt, which becomes wholly converted into a gaseous substance during the operation of baking, causes the dough to swell up into air bubbles, which carry before them the stiff dough, and thus it renders the dough porous; the salt itself is at the same time totally volatilized during the operation of baking. . . Potatoes are likewise largely, and perhaps constantly, used by fraudulent bakers, as a cheap ingredient, to enhance their profit. . . . There are instances of convictions on record, of bakers having used gypsum, chalk, and pipeclay, in the manufacture of bread."

A gentleman, lately writing from the north of England, says that he found in one sample of flour which he recently examined, upwards of 16 per cent. of gypsum, and in another 12 per cent. of the same earth.

Sometime since it was discovered that some of the bakers in France and Belgium added blue vitriol to their dough to make it take more water. It is said that they dissolved 1 oz. of this sulphate in a quart of water, and added a wine-glassful of this solution to the water necessary to make about 50 4 lb. loaves. To the credit of the English baker, no such poisonous materials have ever been found mixed with his bread. *This fraud* may be discovered by boiling a little of the bread in water, to which 5 or 6 drops of nitric acid have been added, and testing the filtered liquor with prussiate of potash, which will give a brown precipitate if copper be present.

Alum may be detected by boiling the bread in water, and adding a little chloride of barium or lime water, or a little water of ammonia, either of which will produce a white precipitate.

Chalk, whiting, burnt bones, plaster of Paris, and similar substances are easily detected by burning a little of the flour or bread in a clean open vessel, when the amount of ashes left will indicate the quantity of adulteration. The quantity of ashes left by genuine flour is very trifling indeed.

Caution. If you purchase bread from the bakers, by all means buy the *best*. When you make it yourself, however, various additions may be made of a wholesome kind, that will render it cheaper. Thus mashed potatoes, ground bran, potato farina, and several other articles may be added at pleasure. Mixing the flour up with a decoction of bran, pumpkins, Iceland moss, and some other similar substances, has been recommended, and it is said that flour so mixed will yield *one quarter* more bread than when water *alone* is used, and that it will keep good for some time.

BREAD, BEE. This is the matter collected by the bees to form the bottom of the hive; it resembles a mixture of rosin and wax; its fumes are thought to be anti-asthmatic.

BREAD, BRAN. *Prep.* I. Mix with ½ a peck of flour, containing the whole of the bran, a ¼ of a pint of small-beer yeast, and a quart of lukewarm water; stir it well with a wooden spoon until it becomes a thick batter, then put a napkin over the dough, and set it about three feet from the fire, until it rises well. Add, if requisite, a little more warm water, strew over it a tablespoonful of salt, and make the whole into a stiff paste. Put it to the fire, and when it rises, again knead it into the dough. If baked in tins, the loaves will be improved.

II. To every pound of flour add ¼ lb. of bran, and proceed as above.

BREAD, EXTEMPORANEOUS. *Prep.* I. (*Ammoniacal Bread.*) Dissolve 1 oz. of sesquicarbonate of ammonia in water, sufficient to make 7 lbs. of flour into a dough, which must be formed into loaves and baked immediately.

II. Divide the flour (8 lbs.) into two portions; mix up the first with water, holding in solution 2 oz. of bicarbonate of soda, and the second with the other portion, to which 1 oz. of muriatic acid has been added. When each mass of dough has been separately well kneaded to a proper consistence, mix them together (perfectly) as quickly as possible; form the mass into loaves, and bake immediately.

Remarks. This bread is considered very wholesome. It contains no yeast.

BREAD, FRENCH. *Prep.* I. Put 1 pint of milk into 3 quarts of water. In winter let it be scalding hot, but in summer, little more than milk-warm: put in salt sufficient. Take 1½ pints of good ale yeast, free from bitterness, and lay it in 1 gallon of water the night before. Pour off the yeast into the milk and water, and then break in rather more than ¼ lb. of butter. Work it well till it is dissolved; then beat up 2 eggs in a basin, and stir them in. Mix about 1½ pecks of flour with the liquor, and, in winter, make the dough pretty stiff, but more slack in summer; mix it well, and the less it is worked the better. Stir the liquor into flour, as for pie-crust, and after the dough is made cover it with a cloth, and let it lie to rise, while the oven is heating. When the rolls or loaves have lain in a quick oven about a quarter of an hour, turn them on the other side for about a quarter of an hour longer. Then take them out and chip them with a knife, which will make them look spongy, and of a fine yellow, whereas rasping takes off this fine color, and renders their look less inviting.

II. Proceed as for the best bread; use the finest flour, and moisten it with a little milk.

BREAD, FRENCH COUNTRY WHITE This is made without yeast.

BREAD, FRENCH SOUP. This is made by adding 1 lb. or more of salt to each sack, in the place of yeast; and it is baked in thin loaves, so as to be nearly all crust, by which means it becomes more soluble in the hot soup.

BREAD, FROM AMERICAN FLOUR. This flour requires nearly twice as much water to make it into bread, as that made from English wheat, and is therefore much more economical. 14 lbs. of American flour will make 21½ lbs. of bread, but the best sort of English flour produces but 18½ lbs. (Mrs. Rundell.)

BREAD, FROM GRAINS. "Birkenmayer, a brewer of Constance, has succeeded in manufacturing bread from the farinaceous residue of beer. 10 lbs. of this species of paste, 1 lb. of yeast, 5 lbs. of ordinary meal, and a handful of salt, produce 12 lbs. of black bread, both savory and nourishing."

BREAD, (*For one sack.*) Flour 1 sack; salt

4 lbs.; water, sufficient quantity; yeast 4 pints. Dissolve the salt in $3\frac{1}{2}$ gallons of the water, (warm,) then add a little of the flour and the whole of the yeast; make a dough, and keep it in a warm place until it rises, then add more flour and warm water in the same way, and work again; after 3 or 4 hours add the remainder of the flour, and sufficient water to bring the dough to a proper consistence. When the whole mass of dough is in a proper state, it is to be cut into loaves and baked.

Remarks. The bakers employ alum in making their bread, as it not only makes the dough more retentive of moisture, but improves the color of the bread. The proportion is usually 6 or 8 oz. of alum per sack, or even more.

By this process a sack of flour will produce from 345 to 350 lbs. of *well*-baked bread, or if slack-baked, from 370 to 385 lbs. of crumbling bread.

BREAD, HICK'S PATENT. This is merely bread made in the common way, but baked in an oven so arranged that the vapors arising during the process may be condensed in a suitable receiver. The condensed liquor is a crude, weak spirit, produced during the fermentation of the bread. The product will not pay the expense and trouble of the collection.

BREAD, HOUSEHOLD. (*Economical Bread.*) *Prep.* I. Remove the flake bran from the flour, and boil 5 lbs. of it in 4 gallons of water, until it is reduced to $3\frac{1}{2}$ gallons; strain. With this liquor knead 56 lbs. of the flour, adding salt and yeast as for other bread. Bake the loaves for $2\frac{1}{2}$ hours. (Rev. Mr. Haggett.)

II. Mix 7 lbs. of flour with 3 lbs. of mealy potatoes, previously well mashed, add 2 or 3 spoonfuls of salt, and make a dough with water; then well work it with 3 or 4 spoonfuls of yeast, and after 4 hours bake it.

BREAD, IMPROVEMENT OF. A $\frac{1}{2}$ oz. of carbonate of magnesia added to the flour, for a 4 lb. loaf, materially improves the quality of the bread, even when made from the worst new seconds flour. (Professor E. Davy.) This addition is perfectly innocent.

BREAD, ICELAND MOSS. This vegetable may be made into bread, either alone, or mixed with flour. It is used, in the first case, in the state of meal, in the same way as flour; in the second case, 7 lbs. of it are directed to be boiled in 12 or 13 gallons of water, and employed to make 70 lbs. of flour into dough, which is then fermented and baked in the usual way. It is said that the above quantity of flour will produce, in this way, 160 lbs. (?) of good household bread, whereas the same flour, treated in the usual way, would not produce more than 80 lbs. A simpler mode of making this bread, is to mix 1 lb. of lichen meal with $3\frac{1}{2}$ to 4 lbs. of flour. The bitterness of the lichen is extracted by soaking it in cold water.

BREAD, LEAVENED. *Prep.* Take about 2 lbs. of dough of the last making, which has been raised by barm; keep it in a wooden vessel, covered well with flour. This will become leaven when sufficiently sour. Work this quantity into a peck of flour with warm water. Cover the dough close with a cloth, or flannel, and keep it in a warm place; further, mix it next morning with 2 or 3 bushels of flour, mixed up with warm water and a little salt. When the dough is thoroughly made, cover it as before. As soon as it rises, well knead it into loaves. Observe in this process, that the more leaven is put to the flour, the lighter the bread will be, and the fresher the leaven, the less sour will it taste.

BREAD, PARIS WHITE. *Prep.* To 80 lbs. of the dough, before the yeast was added, from yesterday's baking, add as much lukewarm water as will make 320 lbs. of flour into a thin dough; as soon as this has risen, 80 lbs. are to be taken out and reserved in a warm place as leaven for the next baking, and 1 lb. of dry yeast, dissolved in warm water, is to be added to the remaining portion, which is immediately made into loaves, and shortly afterwards baked, the loaves being placed in the oven without touching each other, that they may become crusty all round.

BREAD, POTATO. *Prep.* I. To mealy potatoes, well mashed, add an equal quantity of dough, made with flour, then add a proper quantity of yeast, and mix in as much potato farina, or wheat flour, as will suffice to bring it to a proper consistence. Ferment and bake, as usual.

II. Mix equal parts of potato starch and finely-pulped potatoes, and work them into a dough over night, adding the proper quantity of yeast; the next morning work in the same quantity of potato starch, mashed potatoes, and wheat flour, adding as much hot water as may be required; let it stand to rise, then work it well, cut it into loaves, and in 2 hours put them into the oven.

BREAD, SOURNESS IN. (*To rectify.*) When the dough has become sour from the fermentation proceeding too far, or the flour being of inferior quality, the addition of about a $\frac{1}{4}$ oz. of carbonate of magnesia, or a little carbonate of soda, will remove it. When it arises from the sourness of the yeast, this method is especially applicable.

BREAD, STEAM-BAKED, (*à la Vienne.*) It has been known for some time at Vienna, that if the hearth of an oven be cleaned with a moistened wisp of straw, bread baked therein immediately afterwards presents a much better appearance, the crust having a beautiful yellow tint. It was thence inferred that this peculiarity must be attributed to the vapor, which being condensed on the roof of the oven, fell back on the bread. At Paris, in order to secure with certainty so desirable an appearance, the following arrangement is practised:—The hearth of the oven is laid so as to form an inclined plane, with a rise of about 11 inches in 3 feet, and the arched roof is built lower at the end nearest the door, as compared with the farthest extremity. When the oven is charged, the entrance is closed with a wet bundle of straw. By this arrangement the steam is driven down on the bread, and a golden-yellow crust is given to the bread, as if it had been previously covered with the yelk of an egg. (Hbgen Correspondent, Sept. 27. Ann. of Chym. and Prac. Pharm.)

BREAD, TO SWEETEN, (WITHOUT SUGAR.) It is not generally known that pure starch added to flour and made into dough, will be partially converted into a species of sugar during the process of fermentation and baking, and produces sweet wholesome bread. From the experiments of Dr. Colquhoun, it appears that starch arrowroot, farina of potatoes, or similar amylaceous substances, made into a jelly with hot water, may be

employed for this purpose with advantage. It is only necessary to mix the flour up with the jelly, instead of mere water, to add yeast and salt, and to bake in the common way. Dr. Percival has recommended the addition of salep for this purpose. 1 oz. of salep dissolved in 1 quart of water; 2 lbs. of flour; 80 grains of salt, and 2 oz. of yeast, gave 3 lbs. 2 oz. of good bread; but the same weight of materials, without the salep, gave only 2¾ lbs. If too much salep be added, however, it will give its flavor to the bread.

BREAD, WHITING'S, (PATENT.) This is made by dividing the dough into two portions; to the one a little carbonate of soda is added, to the other, a little dilute muriatic acid; they are both well kneaded separately, then mixed together, formed into loaves, and baked immediately. No yeast is used.

BREATH, FŒTID. Scarcely any thing is more disagreeable or disgusting than a stinking breath. Various means have been proposed to remove this annoyance, depending principally on the administration of aromatics, which by their odor might smother it for a time; but these require continual repetition, and are liable to interfere with the functions of digestion. The real cause of a stinking breath is either a diseased stomach or carious teeth; when the former is the case aperients should be administered; and if these do not succeed, an emetic may be given, followed by a dose of salts, or castor oil occasionally. When rotten teeth are the cause, they should be removed; or, if this be impossible, they should be kept clean. Dirty teeth often cause the breath to smell. The use of the tooth-brush should be a daily habit. Occasionally rinsing out the mouth with a little clean water, to which a few drops of a solution of chloride of lime, or chloride of soda, has been added, is an effective method. The following lozenges have also been recommended:—

Gum catechu 2 oz.; white sugar 4 oz.; orris powder 1 oz.; make them into a paste with mucilage, and add a drop or two of neroli. One or two may be sucked at pleasure.

BREAKFAST POWDER. *Syn.* RYE COFFEE. DILLENIUS'S DITTO. HUNT'S ECONOMICAL BREAKFAST POWDER. Rye roasted along with a little fat. *Use.* As a substitute for foreign coffee, of which it is one of the cheapest and best.

BREE'S ANTI-ASTHMATIC PLASTER. *Prep.* Simple diachylon 1 oz.; powdered camphor and powdered opium, of each ¼ oz.; sweet oil ½ a teaspoonful. *Proc.* Melt the plaster with the oil, then remove the vessel from the fire, and stir in the powders; spread it on leather before it gets cold. *Remark.* It is better made with only half the above quantity of opium.

BREWING. The art of making beer.

General notice. Before entering on a description of the process of brewing, it will be necessary to notice the apparatus and materials required for its conduct.

The apparatus consists of,

1. *A copper or boiler* capable of holding fully two-thirds of the quantity proposed to be brewed; with a gauge-stick to determine the number of gallons of fluid at any given depth therein. A copper holding about 140 gallons is a convenient size for brewing a quarter of malt.

2. *A mash-tub,* or *tun,* capable of containing rather more than the copper.

3. *One or more tuns, or vessels,* to ferment the beer in.

4. *Three or four shallow coolers* to reduce the wort as rapidly as possible to a proper temperature for fermenting.

5. *One or two copper or wooden bowls,* for bailing, &c.

6. *A thermometer* with a scale reaching from zero to above the boiling point of water.

7. *A suitable number of casks* (clean) to contain the beer.

8. *One or more large funnels, or tunners.*

9. *Two or more clean pails.*

10. *A hand-pump* of a size proportionate to the brewing.

These articles will vary in value from £10 upwards, to many hundreds, according to the extent of the brewing; but the whole of them, necessary for a private family, may be bought for less than the former amount. By proper care they will last for 30 or 40 years, and still be in a useful state. The place where these vessels are kept, and the operations carried on, is called the "*Brewhouse.*"

The materials necessary to brew beer are, *good malt, hops,* and *water,* and a little *yeast.*

The *malt* is bruised or crushed in a mill before brewing, that it may be acted on the more readily by the water. It should not be ground too small, as it would then make the wort thick; the crushed malt may advantageously lie for a few days in a cool situation, by which it will attract a considerable quantity of moisture from the air, and consequently its soluble portion will be the more easily dissolved out by the water used in mashing. Pale malt may be used coarser than amber or brown malt. A bushel of malt should make a bushel and a quarter when ground, and a quarter should yield between 9½ and 10 bushels, the quantity slightly varying according to the degree of bruising it has undergone. On the large scale, malt is ground in crushing mills, furnished with iron rollers; and on a small scale, by wooden rollers or small mills worked by hand. For private brewing, the malt is generally bought ready ground, for convenience sake. (See MALT.)

The hops should be those of the previous season, and for general purposes grown in Kent; but for the finer sorts of malt liquor, East Kent hops should be used; and where it is intended to be kept for some long time, those known by the names of *Country's, Alton's,* or *Farnham Hops* must be employed. The quantity of hops required to a given measure of malt varies from 2 lbs. to 8 lbs. of the former, to 1 quarter of the latter, according to the nature of the brewing. For good strong beer, 4 lbs. or 4½ lbs. is usually sufficient, but when the liquor is very strong, and it is intended to be highly aromatic, and to be kept for a long period, 1 lb. of hops may be used to every bushel of malt, or 8 lbs. to the quarter. Mild porter has about 3 lbs. to the quarter, and weak common beer has frequently only about ¾ lb. of hops to the bushel of malt. A portion of hops is also frequently added to the finer sort of beer, after it is casked, as we shall presently explain.

The water should be *soft* and *clear,* the *yeast sweet* and *good,* and all the vessels and casks both

sweet and *clean*. If this be not the case, with the latter especially, the best brewing in the world will be useless.

PROCESS OF BREWING. This may be divided into

I. *The mashing*. This operation consists in placing the ground or bruised malt in a large tub or "*tun*," known by the name of the "*mash-tun*," macerating it for some time in hot water, and lastly drawing off the wort from a hole in the bottom, over which a bunch of straw, or a strainer, or false bottom, is placed, to prevent the malt passing out along with the liquor. During the process of mashing, a peculiar principle, called by chemists *diastase*, reacts upon the starch also contained in the malt, and converts it first into a species of gum, called by the French chemists "*dextrine*," and then into a species of sugar resembling that produced by the action of sulphuric acid. The greater the quantity of starch converted into sugar in this way, the stronger and finer will be the wort. It therefore becomes a desideratum with the brewer to mash at a temperature that will most fully promote this object. It has been found that the best temperature for this purpose varies from 157° to 160°, but when more than one liquor is used, the first should be something lower than the former, the next may be between the two, and the third may slightly exceed the latter, or be about 165° or 170°. The action of the first mash is merely to extract the sugar contained in the malt already formed; that of the second to convert the starch into sugar by the action of the diastase; the third to fully complete this object, as well as to carry away the remaining portions of extract.

The mashing is usually performed by filling the copper with water, and as soon as it acquires the temperature of 145° in summer, or 167° in winter, 45 gallons are run off into the mash-tun, and 1 quarter of crushed malt gradually thrown in and well mixed by laborious working, until it becomes thoroughly incorporated and no lumps remain; the agitation is then continued for 30 or 40 minutes, when 36 gallons of water from the boiler, at a temperature of 200°, are added, and the whole again well agitated until thoroughly mixed. The mash-tun is now closely covered up, and allowed to stand for an hour or an hour and a half. At the end of this time the tap is set, and the wort is drawn off into the "underback," and generally amounts to about 50 to 52 gallons: 60 gallons of water, at a temperature of 200°, are next added to the mash-tun, previously drained well, and after being well worked, the whole is covered up as before. This mash is allowed to remain for an hour, when it is drawn off, and the malt again drained ready for the third mash. This time only 35 gallons of water are added at 200°, and allowed to stand for ½ an hour, when it is run off in the same manner as before, and the malt allowed to drain. The worts are now ready for boiling.

In some cases only the first and second mash is used for strong beer, and the third kept for table, or as water to mash a fresh quantity of malt with. In Scotland (see SCOTCH ALE) the brewer only mashes *once*, and afterwards washes his malt by frequent showers or "sparges" of water, by which he gets a wort of greater strength in proportion to its quantity. In operating as above, the average or mean temperature of the first mash is 145°, of the second 170°, and of the third 180°. In winter the mean temperature may be reckoned as 6 or 7° lower. A quarter of malt in this way will produce a wort having a specific gravity by the saccharometer of 1·234, or equal to 84 lbs. of extract. (See SACCHAROMETER.)

It is calculated that 32 gallons of the water employed in the mashing remain in the grains after the wort is drawn off.

II. *Boiling*. The wort is next transferred to the copper, and heated to the boiling point as soon as possible. In large breweries where several coppers are employed, the first mash is no sooner run into the underback, than it is transferred to the wort copper, and immediately boiled, and the successive mashings added as soon as drawn off; but in private houses, where there is only one copper, the boiling cannot be commenced until the water for the last mashing is removed. In some cases the worts are brewed separately, thus producing 2 or 3 qualities of beer, viz. *strong ale or stout, beer, and table beer*. No sooner has the boiling commenced than the hops may be added, and the boiling continued for 2 or 3 hours or more. In some breweries the beer is boiled for several hours, and in Belgium it is said that this is even continued for 10 or 12 hours, but too much boiling drives off the flavor of the hops. In general, two hours good boiling will be found sufficient. In small brewings the first wort should be sharply boiled for 1 hour, and the second for 2 hours. But if intended for beer of long keeping, the time should be extended half an hour. The hops should be strained from each preceding wort, and returned into the copper with the succeeding one. Between the boilings the fire should be damped with wet cinders, and the copper door set open.

For small-beer only half an hour is necessary for the first wort, 1 hour for the second, and 2 hours for the third.

It is reckoned that $\frac{1}{8}$ to $\frac{1}{18}$ part of the wort is dissipated in steam during the process of boiling, but this must of course depend altogether on the evaporative power of the boiler and the length of time the boiling is continued.

III. *Cooling*. The boiling being finished, the wort is run off from the copper into the hopback, which is furnished with a strainer to keep back the hops. It is then pumped into large square shallow vessels called "*coolers*," where it is exposed to a good current of air to cool it down to a proper fermenting temperature as quickly as possible. This is of the utmost importance for the success of the brewing. The wort should be laid so shallow as to cool within 6 or 7 hours to the temperature of about 60°. In warm weather, the depth should not exceed 3 or 4 inches; but in cold weather it may be 5 or 6 inches. As soon as the heat has fallen to about 60°, it should be instantly tunned and yeasted.

It is reckoned that by the joint evaporation from the boilers and coolers, there is a loss of about 40 gallons per quarter.

In private families a good way is to bring the wort from the copper in pails, and to pour it into a basket or a hamper, set over the coolers, by which means the hops will be retained, and the beer run through clear.

IV. *Fermentation.* When the wort is sufficiently cool, it is run into the fermenting tuns or vessels, which in small brewings may be casks, with one of their heads removed. These are called "*gyle tuns,*" and should not be more than $\frac{3}{4}$ full. The yeast, previously mixed with a little wort, and kept until this latter has begun to ferment, may now be added, and the whole agitated well; the tun should then be covered up, until the fermentation is well established. During this process the temperature rises from 9° to 15°.

The quantity of yeast employed, and the temperature of the wort when it is added, differ in different breweries and for different kinds of beer. From $\frac{1}{2}$ to $1\frac{3}{8}$ of yeast, taken from a previous brewing of the same kind of beer, is the quantity usually employed. The higher the temperature the less yeast necessary. In England, the temperature at which the yeast is usually added, varies from 55° to 65° Fahr. In cold weather, the heats in the coolers should be 5° or 6° higher than in mild and warm weather. For ale, in cold weather, it should be tunned as soon as it has fallen to 60° in the coolers. For porter, to 64°, and for table beer to 70°; and in warm weather, strong beer should be 4° or 5° less, and table beer 7° or 8°. Care should be also taken that the worts do not get cold before the yeast is mixed to produce fermentation. The common rule for mixing the yeast is $1\frac{1}{2}$ lbs. to every barrel of strong beer wort, and 1 lb. to every barrel of table beer wort.

The commencement of the fermentation is indicated by a line of small bubbles round the sides of the tun, which, in a short time, extends over the surface. A crusty head follows, and then a fine rocky one, followed by a light frothy head. In the last stage, the head assumes a yeasty appearance, and the color is yellow or brown, the smell of the tun becoming strongly vinous. As soon as this head begins to fall, the tun should be skimmed, and the skimming continued every two hours till no more yeast appears; this closes the operation, and the beer should then be put into casks, or, in technical language, "*cleansed.*" A minute attention to every stage of this process is necessary to secure a fine flavor and a brilliant beverage.

In Scotland the temperature at which the yeast is added, is generally much lower than in England; for ale, it is from 51° to 52°, and the whole process is conducted in the cooler part of the year, so that the temperature seldom rises higher than 65° or 66°. The Bavarian beer, so much celebrated on the continent, as well as the finest kinds of East India ale, are fermented at very low temperatures.

It may be generally regarded as a rule, that the lower the temperature, and the slower, more regular and less interrupted the process of fermentation, the better will be the product and the less likely to change by age. More yeast is required in winter than in summer. Should the fermentation become slack in the gyle-tun, a little more yeast is frequently added, and the whole is roused up; but on the contrary, should the temperature rise considerably, or the fermentation become too active, the wort should be cooled a little and skimmed, or at once cleansed.

V. *Cleansing.* When the fermentation has proceeded to a certain extent, the liquor undergoes the operation called "cleansing." This consists in drawing it off from the gyle tun into other vessels, or casks, set sloping, so that the yeast, as it forms, may work off the one side of the top, and fall into the vessel placed below to receive it. In small brewings, the beer is often at once transferred from the gyle tun to the store casks, which are sloped a little until the fermentation is over, when they are skimmed, filled, and bunged up. When the operation of cleansing is not employed, the yeast is removed from the surface of the gyle tun with a skimmer, and the clear liquor drawn off into the store casks.

The process of cleansing should always commence as soon as the gravity of the liquor falls to 10 or 11 lbs. per barrel, which it usually does in about 48 hours, provided the fermentation has been well conducted. Some brewers add $\frac{1}{4}$ to $\frac{1}{2}$ lb. of wheat or bean flour to the beer in the gyle-tun, shortly before cleansing, to quicken the discharge of yeast, but it is not clearly ascertained whether such a plan be advantageous or the contrary.

VI. *Storing.* As soon as the fermentation is concluded, which generally takes from 6 to 8 days, or more, the clear liquor is drawn off into the store casks, or vats, which are then closely bunged down, and deposited in a cool cellar.

VII. *Ripening.* After a period, varying from 1 to 12 months, or more, according to the nature of the brewing, the liquor will have become fine, and sufficiently ripe for use. All the attention required during this interval, is to look occasionally to see that there is no leakage, and to open the vent holes, should any oozings appear between the staves of the casks.

VIII. *Fining.* It frequently happens that malt liquor, especially porter, with all the care bestowed upon it in brewing, will not turn out sufficiently fine to meet the taste and eye of the consumer, in which case it is usually subjected to the operation of "*clarifying.*" For this purpose 1 oz. of isinglass is put into 1 quart of weak vinegar, or still better, hard beer, and when dissolved, a sufficient quantity of good beer may be added to make it measure 1 gallon. This mixture is called "finings;" 1 to 2 pints of which is the proper quantity for a barrel. The method of using it, is to put the finings into a bucket, and to gradually add some of the beer, until the bucket is three parts full, during which time it is violently agitated with a whisk, and this is continued until a good frothy head is raised upon it, when it is thrown into the barrel of beer, and the whole well rummaged up, by means of a large stick shoved in at the bunghole. In a few days the beer will usually become fine.

In some bad sorts of beer isinglass will have no effect. This may be ascertained beforehand, by trying some in a long glass tube, or vial, with a little of the finings. These should be well shaken together, and then set aside for a short time, when it will be found that the finings will rise to the top, leaving the central portion of the beer clear, if it be in a proper condition for clarifying; but if, on the contrary, they sink to the bottom, and the liquor still keeps foul, no quantity of finings, how-

ever great, will ever clarify it. This latter defect may be remedied by proceeding to fine it after the manner above described, and then adding, *after* the finings have been well rummaged up, either 1 spoonful of oil of vitriol, or gum catechu, dissolved in ½ a pint of warm water, again rummaging well for a quarter of an hour. Or 1 or 2 oz. of tincture of catechu may be used instead, mixed with a little water. Either of these additions acts chemically on the finings, in the same way as good beer does, precipitating them along with the foulness, and thus brightening the liquor. The addition of a handful of hops, previously boiled for 5 minutes in a little of the beer, and then added to the barrel, and the whole allowed to stand for a few days, before proceeding to clarify it, will generally have the same effect.

Concluding Remarks. *The nature and varieties of beer, &c.* The numerous varieties of beer met with in commerce, arise either from a difference in the materials, or the management of the brewing. Thus the *water*, but more generally the nature of the malt, or the temperature of the mashing or the fermentation, decides the character of the liquor. The difference between ale and porter arises from the color of the malt, and the distinctions between the same class of liquor, brewed from similar materials, may be referred to the mashing or the fermentation. Scotch ale and Bavarian beer differ in style from other ales, as before explained, from being fermented at lower temperatures; and porter differs from either of these, because it has been made with higher dried malt. This is the cause of the almost endless varieties of malt liquor met with in England. Every country—nay, every town and every brewer, is distinguished by the production of a different flavored beer. Besides the varieties arising from difference of quality or manipulation in the brewing of similar kinds of liquor, there are certain leading features which distinguish some of them, which has led them to be considered in the light of distinct members of the same family. These are *ale*, *beer*, and *porter*. *Ale* is a pale liquor, brewed from lightly-dried malt, and is usually met with, abounding in undecomposed saccharine matter and mucilage; *beer* is a fine, strong, well-fermented liquor, darker, less saccharine, and more alcoholic than ale. The finer class of Scotch, Bavarian, and East India ales, properly belong to this class; *porter* is a dark brown colored liquor, originally prepared from high-dried malt, but now generally made from pale malt, and colored and flavored by patent or burnt malt. *Small or table beer* is a weak liquor, containing 3 or 4 times the quantity of water that is used for ordinary beer. *Stout, brown stout*, &c. are varieties of porter, differing only in their strength. See Ale, Beer, and Porter, in their alphabetical order.

Qualities. The characteristics of good beer are transparency and a fine color, to whatever variety it may belong; and if it has been properly brewed, this will usually be the case. Hence color and transparency become a proof of good beer. Good beer is pleasant, wholesome, and nutritious, at the same time that it is strengthening and exhilarating.

Season for brewing. The best times of year for brewing are the spring and autumn, as at those periods the temperature of the air is such as to permit the cooling of the worts sufficiently low, without having recourse to artificial refrigeration, or the use of machinery for that purpose.

Adulteration. Laws respecting brewing, &c. By the laws of England, which have existed, with slight modifications, ever since the days of Queen Anne, *nothing* is allowed to enter into the composition of beer but malt and hops. The cupidity of the fraudulent brewer has, however, frequently induced him to introduce other ingredients with the view of imparting a false strength to his liquor, or as a substitute for one or other of its constituents. Thus, *to impart bitterness*, and to lessen the quantity of hops required for the beer, *quassia, gentian, wormwood*, and *broom-tops* have been used; *to give pungency and flavor, capsicum, and grains of paradise*, (in concentrated tinctures,) *ginger, corianders, orange-peel, and caraways;* to give *intoxicating properties—opium, cocculus indicus, nux vomica, tobacco, extract of poppies and tincture of henbane;* as a *substitute for malt—molasses, coloring and sugar;* to impart a *false appearance of age—sulphuric acid, alum, green vitriol*, and *common salt*. The following is a list of the unlawful substances seized at different breweries, and brewers' druggists' laboratories in London, as copied from the minutes of the committee of the House of Commons. "*Cocculus indicus, multum*, (*an extract of the cocculus*,) *coloring, honey, hartshorn shavings, Spanish juice, orange powder, ginger, grains of paradise, quassia, liquorice, caraway seeds, copperas, capsicum, mixed drugs.*"

Sugar and coriander seeds may be mentioned as a very common addition to beer. It is said that 6 lbs. of the former, and 1 lb. of the latter, are equal in strength and intoxicating quality to a bushel of malt. The sugar is employed in a roasted state, for the sake of its color; even coffee has been used for this purpose. *Publicans* generally reduce their strong beer with water, or table beer, and add treacle, (which they call "*foots*,") and a mixture of copperas, salt, and alum, (which they call "*heading*,") to make it bear a frothy head, and in many cases, gentian, sugar, or other similar ingredients, are added to keep up an appearance of strength, and to impart a flavor.

The "*cheap beer*" sold by some taverns in London, is made by dividing the contents of *two* butts among *three* butts, filling them up with water, and adding a bladder of *porter extract* (technically termed P. E.) to each.

The desire of evading the duty on malt, led to the discovery of its being only necessary to malt ⅓ or less of the grain, this portion being sufficient to convert the starch of the other part into sugar, in the process of mashing. This plan answers well when the wort is merely intended for the production of "*grain spirit*," but beer so made is inferior in quality to that brewed wholly from malt. Inferior kinds of beer have also been made from other ingredients than barley malt; thus, the grain of other cereals may be used for this purpose, as wheat, oats, &c., and many other vegetable substances that contain starch and sugar. *Potatoes, turnips, beet root, carrots, parsnips*, and other similar roots and seeds, will all produce beer by peculiar management, but the liquor must be con-

fined to private consumption, as the law does not permit its sale. Some of the above articles produce very wholesome beer, if mashed with about $\frac{1}{10}$ or $\frac{1}{12}$ of their weight of good barley malt.

The densities of the worts employed for different kinds of beer vary considerably, as will be seen by the following table.

TABLE exhibiting the densities of different kinds of Beer.

Description.	Pounds per Barrel.	Specific Gravity.
Burton Ale, 1st Class	40 to 43	1·111 to 1·120
Do. 2d "	35 to 40	1·097 to 1·111
Do. 3d "	28 to 33	1·077 to 1·092
Ordinary Ale . . .	25 to 27	1·070 to 1·073
Common Ale . . .	21	1·058
Scotch Ale, 1st Class	40 to 44	1·111 to 1·122
Do. 2d "	33 to 40	1·092 to 1·111
Porter (ordinary) . .	18	1·050
Do. (good) . . .	18 to 21	1·050 to 1·058
Do. (double) . . .	20 to 22	1·055 to 1·060
Brown Stout . . .	23	1·064
Do. (best) . . .	26	1·072
Table Beer	12 to 14	1·033 to 1·039
Table Beer (common)	6	1·014

BREWING UTENSILS, TO CLEAN AND PRESERVE. In cleaning them before being put away, avoid the use of soap, or any greasy material, and use only a brush and scalding water, being particularly careful not to leave any yeast or fur on the sides, then place them away in a clean, and moderately dry situation. Should they become tainted or mouldy, take a strong lye of pearlash, which spread over the bottoms of the vessels scalding hot, and then with the broom scrub the sides and other parts.

Or, take common salt and spread it over the coolers, &c., and strew some on their wet sides, turn in scalding water and scrub them with a broom.

Or, throw some quicklime into water in the vessel, and scrub over the bottom and sides with it; in each case well washing afterwards with clean water.

Or, wash well first with oil of vitriol diluted with 8 times its weight of water, and afterwards with clean water.

Remarks. Brewing utensils with care will last for many years. Mr. Cobbett says: "I am now in a farm-house, where the *same* utensils have been used for *forty years;* and the owner tells me that they may last for *forty years longer.*"

BRINE, RED CABBAGE. *Prep.* Steep red cabbage leaves in a strong solution of salt. *Use.* As a test for acids and alkalis.

BRINE, VIOLET. *Prep.* The same as the above, but made from the petals of the blue violet.

BRIOCHE PASTE, (IN COOKERY.) *Prep., &c.* A paste made of eggs and flour, fermented with a ttle yeast, to which a little salt, a large quantity of sugar, and half as much butter as the weight of the flour used, are afterwards added and well worked in. *Use.* As an addition to soup, a casing for lobsters, patties, eggs, &c.

BRITANNIA METAL. *Syn.* TUTANIA. A fine species of pewter.

Prep. Melt together equal parts of plate brass, bismuth, antimony, and tin, and add the mixture at discretion to melted tin, until it acquires t proper degree of color and hardness.

II. To the last add an equal part, or ½ of i weight of metallic arsenic. To be used as befo

III. Melt together 1 part of antimony, 4 par of brass, and 5 or more parts of tin. This may used at once, as Britannia metal. (See PEWTER

BRITISH GUM. When starch is exposed a temperature of 300°, (Ure,) 600°, (Brande,) becomes brown, soluble in cold water, and ceas to strike a blue color with iodine. It is large employed by the calico printers, as a substitute f gum.

BRISTLES AND HORSE HAIR, TO DYE. These readily take any of the usual dyes applied to cotton or wool.

BROMAL. A compound discovered by Löwig, produced by the action of bromine on alcohol, hence the name, from the first portion of the name of each constituent. (See CHLORAL.)

BROMATES. Compounds of the bases with bromic acid, which see. *Char., Tests, &c.* When heated they evolve oxygen, and become bromides; with nitrate of silver and the proto-salts of mercury, they give white precipitates; that with the former is insoluble in nitric acid, but very soluble in ammonia. If a few drops of muriatic acid be added to a bromate, and it be then shaken with a little ether in a glass tube, a solution of bromine is obtained.

BROMBENZOIC ACID. A new acid, discovered by Peligot, and prepared by exposing benzoate of silver to the vapors of bromine, until they cease to be absorbed, when the acid is dissolved out with ether and obtained by evaporation.

BROMIC ACID. An acid composed of oxygen and brome.

Prep. Add sulphuric acid to a solution of bromate of baryta, until all the earth be thrown down, particularly avoiding an excess of acid; then concentrate the liquor by heat, until it be of the consistence of a sirup.

Prop. If the evaporation be carried too far, the acid will be decomposed. This acid forms salts with the bases, called bromates, which are very similar to the chlorates and iodates. *Bromate of potassa* may be made by agitating bromine with a concentrated solution of caustic potassa, collecting the crystalline white powder that falls down, and purifying it by solution in boiling water, and crystallization. *Bromate of silver* is formed by adding a solution of bromate of potassa to another of nitrate of silver.

BROMIDE. A compound form of a base and bromine. (See BROMINE.)

Char. and Tests. The soluble bromides give white precipitates with nitrate of silver, acetate of lead, and protonitrate of mercury. That from the first of these is insoluble in ammonia water, unless concentrated. A few drops of liquid chlorine poured upon a bromide, and the mixture agitated with a little sulphuric ether, yields an ethereal solution of bromine.

BROMIDE OF AMMONIA, may be formed by the mixture of ammoniacal and hydrobromic acid gases, or liquid hydrobromic acid and liquor of ammonia, or by putting bromine into water of ammonia.

Prep. This salt may be obtained by evaporation

in the form of solid white prismatic crystals. It is volatile and easily decomposed.

BROMIDE OF CARBON. (Discovered by M. Serullas.) *Prep.* Brome 2 parts; periodide of carbon 1 part, mix; just enough solution of potassa is added to make the liberated iodine disappear. The liquid bromide of carbon, which collects at the bottom of the solution, is then separated from the supernatant portion, and allowed to stand until it becomes clear. A few crystals of iodide of potassium rise to the surface, and may be removed. The clear liquid is then put into a little water slightly alkalized with potassa, to remove a little remaining iodide of carbon, after which it is quite pure.

BROMIDE OF IODINE. Bromine and iodine unite rapidly by mere mixture. By careful distillation a red vapor is obtained, which, on cooling, condenses into red crystals, of a form resembling fern leaves. This is said to be the *protobromide.* By adding more bromine, these crystals are converted into a fluid, said to be the *bibromide.*

BROMIDE OF SULPHUR. This is made by dissolving sublimed sulphur in bromine; it is a reddish, oily-looking fluid, easily decomposed, especially by water.

BROMINE. *Syn.* BROME. An elementary substance, discovered by M. Balard, of Montpellier, in 1826.

Prep. A current of chlorine is passed through the uncrystallizable residuum of sea-water, called *bittern,* which then assumes an orange tint, in consequence of bromine being set free from its combinations; sulphuric ether is then agitated with it, and the mixture is allowed to stand until the ethereal portion, holding the bromine in solution, floats upon the surface. This is then carefully decanted, and agitated with a solution of potassa, by which means bromide of potassium and bromate of potash are formed.

The whole is next evaporated to dryness, and submitted to a dull red heat; the residuum is then powdered, mixed with pure peroxide of manganese, and placed in a retort; sulphuric acid, diluted with half its weight of water, is now poured in. Red vapors immediately arise, and condense into drops of bromine, and are collected by plunging the neck of the retort to the bottom of a small receiver, containing cold water. The bromine forms a stratum beneath the water, and may be collected and further purified, by distillation from dry chloride of calcium.

Prop., Use, &c. A dark, reddish-colored liquid, having an odor resembling chlorine. It freezes at —4°, boils at 116·5°, is about 3 times as heavy as water, is very soluble in ether, less so in alcohol, and only slightly so in water. With hydrogen it forms hydrobromic acid, and with the bases, compounds called bromides, or hydrobromates. It possesses similar medicinal properties to iodine, and has been administered in goitre, scrofula, &c., in the form of an aqueous solution, composed of 1 part of bromine to 4 of water; 5 or 6 drops being the dose. This solution has also been used as a lotion.

Tests and Antidotes. The solution of chloride of gold gives a red tinge with hydrobromic acid, or an electro-positive hydrobromate.

When bromine exists in an organic mixture, caustic potassa should be added to the mass, which should then be reduced to an ash, exhausted by distilled water, and chlorine passed through the solution, or the chloride of gold added to it, previously carefully neutralized by hydrochloric acid. When chlorine is used, starch may render the presence of the element more perceptible. Nitrate of silver is also a delicate test, where the bromine is not mixed with chlorine; the bromide of silver is distinguished from the chloride by heating with hydrochloric acid and chlorite of lime, when ruddy fumes are evolved, if bromine is present.

M. Barthez has proposed magnesia as an antidote for bromine. From several experiments, it appears that the bromide of magnesium is by no means an active salt; neither is it inert. From experiments performed on rabbits, I conclude starch in solution, and white of egg, to be excellent antidotes to the poison. (Dr. Glover, Med. and Sur. Jour., No. 152.)

BROMINE, CHLORIDE OF. *Prep.* Transmit a current of dry chlorine through brome, and condense the disengaged vapors in a receiver surrounded with ice. *Prop.* A volatile reddish fluid, soluble in water, without decomposition.

BRONCHITIS. An inflammation of the mucous lining of the bronchia, or smaller ramifications of the windpipe. In its milder form it is commonly called "*a cold on the chest.*"

Symp. Hoarseness, dry cough, a slight degree of fever, followed by expectoration of mucus, at first thin, and afterwards thick and copious. In the severer forms, there is more fever, cough, and oppression at the chest, &c.

Treat. The generality of cases of bronchitis yield to small and repeated doses of ipecacuanha, and antimonial diaphoretics, at the same time adopting a light diet, and keeping the bowels open with mild purgatives.

BRONZE. A metallic alloy, composed principally of tin and copper, remarkable for the exactness of the impressions which it takes by moulding, as well as its durability; and hence, extensively employed in the casting of busts, medals, and statues. Bell, cannon, and speculum metal are varieties of bronze. In ancient times, when the manufacture of steel was ill-understood, cutting instruments were frequently made of this alloy. For statuary work, the great desideratum is to obtain an alloy capable of flowing freely into the most minute outlines of the mould, hard, and yet tough, and capable of resisting the corroding action of the weather. It must also acquire that peculiar antique green appearance, that is so much admired in bronzes.

When only a small quantity of the alloy is required, it is prepared in crucibles, but for statues or larger works, on reverberatory hearths. The fusion of the mixed metals must be conducted under pounded charcoal, and as rapidly as possible. When melted, it must be frequently stirred together to produce a perfect mixture, before casting. Coal is the fuel principally employed for the furnaces.

The proportions of the materials so vary in different castings, that it is almost impossible to say precisely what quantities are the best. The following may be regarded as good specimens. (See also CANNON, BELL, and SPECULUM METAL.)

BRONZE, (FOR STATUARY.) I. Copper 88 parts; tin 9 parts; zinc 2 parts; lead 1 part.

II. Copper 82½ parts; tin 5 parts; zinc 10½ parts; lead 2 parts. These are very nearly the proportions in the celebrated statue of Louis XV.

III. Copper 90 parts; tin 9 parts; lead 1 part.

IV. Copper 91 parts; tin 9 parts.

BRONZE, (FOR MEDALS.) I. Copper 89 parts; tin 8 parts; zinc 3 parts. *Remarks.* This metal assumes a beautiful antique appearance by age, and takes a good impression by stamping.

II. Copper 95 parts; tin 4 or 5 parts. These are the proportions recommended by M. Chaudet, who casts it in moulds made of bone-ash, like cupels, and afterwards finishes and polishes the medals in a coining press. This is also excellent for any small castings.

BRONZE, (FOR CUTTING INSTRUMENTS.) Copper 100 parts; tin 14 parts.

Remarks. M. Dussaussy says that the above alloy, when hardened and tempered after the manner of the ancients, will yield an edge nearly equal to that of steel. Several analyses have been made of ancient cutting instruments, whence it appears that the proportion of tin varies from 4 to 15 per cent., which tends to prove that more depends on the exact mode of tempering the alloy, than on the relative quantities of the ingredients. Zinc and tin are inadmissible in bronze for this purpose. One or 2 per cent. of iron might, nevertheless, be added with advantage. The ancient bronze used for springs, contained only 3 to 4 per cent. of tin.

BRONZE, (FOR MORTARS.) Copper 93 parts; lead 5 parts; tin 2 parts.

Remarks. The edges and lips of mortars must be tempered by heating them to a cherry red, and then plunging them into cold water; as unless so treated, they are very apt to be broken.

BRONZE, (FOR ORNAMENTAL WORK, TO BE GILDED.) I. Copper 82 parts; zinc 18 parts; tin 3 parts; lead 2 parts.

II. Copper 83 parts; zinc 17 parts; tin 1 part; lead ½ part.

BRONZE POWDERS. I. (*Beautiful red.*) *Prep.* Mix together sulphate of copper 100 parts; carbonate of soda 60 parts; apply heat until they unite into a mass, then cool, powder, and add copper filings 15 parts; well mix, and keep them at a white heat for twenty minutes, then cool, powder, and wash and dry.

II. (*Gold colored.*) *Prep. a.* Verdigris 8 oz.; tutty powder 4 oz.; borax and nitre, of each 2 oz.; bichloride of mercury ¼ oz.; make them into a paste with oil, and fuse them together. *Used* in japanning as a gold color.

b. Dutch leaf reduced to an impalpable powder by grinding.

III. (*Iron colored.*) Plumbago finely powdered.

IV. (*Silver white.*) *Prep.* Melt together 1 oz. each of bismuth and tin, then add 1 oz. of running quicksilver; cool and powder.

BRONZING OF MEDALS, AND ORNAMENTS OF COPPER, ELECTROTYPES, &c. *Proc.* I. Having thoroughly cleaned and polished the surface of the specimen, with a brush apply the common crocus powder, previously made into a paste with water. When dry, place it in an iron ladle, or on a common fire-shovel, over a clear fire for about 1 minute; and when sufficiently cool, polish with a plate-brush. By this process a bronze similar to that on tea-urns is produced; the shade depending upon the duration of the exposure to the fire. (Chemist, iii. 49.)

II. By substituting finely-powdered plumbago for crocus powder in the above process, a beautiful, deep, and permanent bronze appearance is produced.

III. Rub the medal with a solution of livers of sulphur, or sulphuret of potassium, then dry. This produces the appearance of *antique* bronze very exactly.

IV. Dissolve 2 oz. of verdigris and 1 oz. of sal ammoniac in 1 pint of vinegar, and dilute the mixture with water until it tastes but slightly metallic, when it must be boiled for a few minutes, and filtered for use. Copper medals, &c., previously thoroughly cleaned from grease and dirt, are to be steeped in the liquor at the boiling point, until the desired effect is produced. Care must be taken not to keep them in the solution too long. When taken out, they should be carefully washed in hot water, and well dried. *Gives an antique appearance.*

V. (*Chinese method.*) Make a paste with 2 oz. each of verdigris and vermilion; 5 oz. each of alum and sal ammoniac, all in fine powder, and vinegar q. s.; then spread it over the surface of the copper, previously well cleaned and brightened, uniformly warm the article by the fire, and afterwards well wash and dry it, when, if the tint be not deep enough, the process may be repeated. The addition of a little blue vitriol inclines the color to a chesnut brown, and a little borax to a yellowish brown. Much employed by the Chinese for copper tea-urns.

VI. Dissolve 1 oz. of sal ammoniac, 3 oz. cream of tartar, and 6 oz. of common salt, in 1 pint of hot water; then add 2 oz. of nitrate of copper, dissolved in ½ a pint of water; mix well, and apply it repeatedly to the article, placed in a damp situation, by means of a brush moistened therewith. *Effect.* Very antique.

VII. Salt of sorrel ¼ oz.; sal ammoniac 1 oz.; distilled vinegar 2½ pints; dissolve. As last.

BRONZING, SURFACE. This term is applied to the process of imparting to the surfaces of figures of wood, plaster of Paris, &c., a metallic appearance. This is done by first giving them a coat of oil or size varnish, and when this is nearly dry, applying with a dabber of cotton or a camel-hair pencil, any of the metallic bronze powders; or the powder may be placed in a little bag of muslin, and dusted over the surface, and afterwards finished off with a wad of linen. The surface must be afterwards varnished.

Paper is bronzed by mixing the powders up with a little gum and water, and afterwards burnishing.

Iron castings may be bronzed by thorough cleaning, and subsequent immersion in a solution of sulphate of copper, when they acquire a coat of the latter metal. They must be then washed in water.

BROOM ASHES. *Prep.* Burn broom stalks and collect the ashes. Sometimes used as a diuretic in dropsy.

BROOM COFFEE. Broom seeds, roasted

with a little butter and then ground. *Use.* As a substitute for coffee.

BROOM, SALT OF. Obtained by dissolving broom ashes in water, filtering and evaporating. *Remarks.* Antacid, consists principally of carbonate of potassa. Sometimes used in dropsy.

BROTH, (IN COOKERY.) The liquor in which meat is boiled; it is distinguished from soup by its inferior strength and quantity of seasoning, &c. The general method of preparing broth is similar to that of soup, to which article the reader is referred.

BROWN DYE. The different shades of this dye vary from pale yellow and reddish brown, up to very dark brown, almost black, every shade of which, however, may be produced as the taste of the workman may dictate, by mixtures of reds and yellows with blues and blacks, or by simple dyes, which at once impart a brown,—as catechu, walnut rinds, or oxide of manganese.

I. (*For Wool.*) *a.* Boil the cloth in a mordant of alum, and common salt dissolved in water, then dye it in a bath of logwood, to which a little green copperas has been added. The proportion of alum should be 2 oz., and of salt 1 oz., to every pound of cloth.

β. Boil the goods in a mordant of alum and sulphate of iron, then wince them through a bath of madder. *Remarks.* The tint depends on the relative proportions of the alum and copperas; the more of the latter, the darker will be the dye. The joint weight of the two should not exceed ⅛ of the weight of the wool. The best proportions are 2 parts of alum and 3 of copperas.

γ. Give the wool a mordant of alum and tartar, then pass it through a madder bath, which will dye it red. It must now be run through a black bath of galls and sumach, or logwood, to which a little acetate or sulphate of iron has been added.

δ. Proceed to mordant the cloth as last, and dye in a madder bath, then remove it and add a little acetate or sulphate of iron, and again pass it through the bath, until the required tint is produced.

ε. Give the cloth a light blue ground with indigo, then give it a mordant with alum, wash in water, and run it through a bath of madder.

ζ. Give the cloth a mordant of alum and tartar, then pass it through a madder bath, and afterwards through a bath of weld or fustic, to which a little iron liquor has been previously added. In this way every shade from mordoré and cinnamon to dark chesnut may be dyed.

η. Boil 1 lb. of fustic chips for 2 hours, and pass the cloth through the bath for 1 hour, take it out and drain, then add 1½ oz. of green copperas, and ½ lb. of good madder, and pass the cloth again through the bath, until the proper tint is produced. This makes bronze browns, but by varying the proportion of the mordant, other shades may be produced.

II. (*For Silk.*) *a.* Give the silk a mordant as before described, then dye in a bath made by mixing the equal parts of decoction of logwood, fustic, and Brazil wood. The shade may be varied by mixing the decoctions in different proportions. *Brazil wood reddening, logwood darkening,* and *fustic yellowing,* the tint.

β. Dissolve 4 oz. of annotto and 1 lb. of pearl-ash in boiling water, and pass the silk through it for 2 hours, then take it out, squeeze it well and dry; next give it a mordant of alum, and pass it *first* through a bath of Brazil wood, and afterwards through a bath of logwood, to which a little green copperas has been added; wring it out and dry; afterwards rinse well.

III. (*For Cotton and Linen.*) *a.* Give the pieces a mixed mordant of acetate of alumina and acetate of iron, and then dye them in a bath of madder, or madder and fustic. When the acetate of alumina predominates, the dye has an amaranth tint. The iron darkens it.

β. First gall the goods, then turn them for a short time through a black bath, next give them a mordant of sulphate of copper, and pass them through a decoction of fustic, afterwards through a bath of madder, and again through the solution of sulphate of copper; drain, dry, and rinse well, then finish with a boil in soap and water. This gives a chesnut brown.

γ. First give a mordant of alum, then pass the goods through a madder bath, and next through a bath of fustic, to which a little green copperas has been added. This gives a cinnamon brown.

Remarks. Browns may be also dyed at once, by what are called substantive or direct dyes; thus—

I. *Decoction of oak bark* dyes wool a fast brown of various shades, according to the quantity employed. If the cloth be first passed through a mordant of alum, the color is brightened.

II. *Infusion or decoction of walnut peels* dyes wool and silk a brown, which, like the preceding, is brightened by alum. The older the liquor the better.

III. *Horse-chesnut peels* also give a brown. A mordant of muriate of tin turns it on the bronze, and sugar of lead the reddish brown.

IV. *Catechu, or terra japonica,* gives cotton a brown dye; blue vitriol turns it on the bronze, and green copperas darkens it, when applied as a mordant, and the stuff dyed in the bath boiling hot. Acetate of alumina as a mordant brightens it. The French color, called "carmelite," is given with 1 lb. of catechu, 4 oz. of verdigris, and 5 oz. of sal ammoniac.

V. *Sulphate or muriate of manganese,* dissolved in water with a little tartaric acid, gives the bronze tint called "solitaire." The stuff, after being passed through the solution, must be turned through a weak lye of potash, and afterwards through another of chloride of lime, to brighten and fix it.

VI. *Prussiate of copper* gives a bronze or yellowish-brown to silk. The piece well mordanted with blue vitriol, may be passed through a solution of *prussiate of potash.*

BROWN PIGMENTS. The principal and most useful of these are, umber and terra di sienna, both burnt and raw. Brown may also be made of almost any shade, by the admixture of blacks with reds and yellow, or with greens, in different proportions.

BROWNING, (IN COOKERY.) A fluid preparation used to color and flavor gravies, soups, &c.

Prep. I. Melt 4 oz. of sugar in a frying-pan, or other convenient vessel, with water, add 1 oz. of butter, and continue the heat until the whole is turned quite brown; then pour in 1 pint of port

wine, stirring well all the time, and remove the pan from the fire. When the whole of the roasted sugar is dissolved, pour it into a bottle, and add ½ oz. each of bruised pimento and black pepper; 6 shalots cut small; a little mace and finely-grated lemon-peel; and a quarter of a pint of mushroom catsup. Digest for a week, occasionally shaking; then strain through a piece of muslin, and preserve for use.

II. Instead of port wine use water, and add a glass of spirits.

III. Sugar coloring 1 pint; salt ¼ lb.; mushroom catsup ½ pint; add spice.

IV. Lump sugar (powdered) 2½ lbs.; salad oil ½ lb.; heat in an iron vessel until quite brown, then add port wine 1 quart; Cape wine 3 quarts; shalots 6 oz.; mixed spice 4 oz.; black pepper 8 oz.; mace 1 oz.; salt ¾ lbs.; lemon juice ½ pint; catsup 1 quart.

V. Good spirit, or sugar coloring, and mushroom catsup, of each 1 gal.; Jamaica pepper, black pepper, and shalots, of each 4 oz.; cloves, cassia, and mace, bruised, of each ¾ oz.; boil in a covered vessel for 5 minutes, then digest for 14 days, and strain.

BROWNING FOR GUN BARRELS. *Prep.* I. Mix 1 oz. each of aquafortis and sweet spirits of nitre; 4 oz. of powdered blue vitriol; 2 oz. of tincture of iron, and water, 1½ pint; agitate until dissolved. *Use.* Rub this on the barrel, previously well polished, and afterwards cleaned off with whiting to remove the oil. Let it remain till the next day, then rub it off with a stiff brush. The liquid may be again applied until a proper color is produced. When this is the case, wash in pearlash water, and afterwards in clean water, and then polish, either with the burnisher or with beeswax; or apply a coat of shellac varnish. (See below.)

II. Blue vitriol and sweet spirits of nitre, of each, 1 oz.; water 1 pint; dissolve as last.

III. Mix equal parts of butter of antimony and sweet oil, and apply the mixture to the iron previously warmed.

Remarks. The varnish used for gun barrels, after they are bronzed, is made by dissolving 1 oz. of shellac and one or two drachms of dragon's blood, in a quart of alcohol; and filtering the solution through blotting paper into a bottle, which must be kept closely corked.

BRUCINE. *Syn.* BRUCIA. BRUCINA. VOMICINA. A vegetable alkali, discovered by Pelletier and Caventou, in the bark of the Brucia antidysenterica, and afterwards combined with strychnia in nux vomica.

Prep. Digest ether on the powdered bark of brucia antidysenterica, to separate a fatty matter; strain, add alcohol at 36° Baume; digest, filter, evaporate to dryness; dissolve the mass in water, add liquid subacetate of lead; filter, pass sulphureted hydrogen gas through the clear liquor; filter again, and add calcined magnesia; filter again, wash the sediment very slightly with cold water, dry, digest in alcohol, filter, and distil off the spirit. To purify the brucine, add a solution of oxalic acid, crystallize, add a mixture of alcohol at 40° Baume, and ether at 60°, to extract the coloring matter, then dissolve the oxalate of brucine in water, add calcined magnesia, filter; digest the sediment in alcohol, filter, and let the spirit evaporate by exposure to the air.

Prop., Use, &c. The crystals thus obtained are soluble in 850 parts of cold and 500 parts of boiling water. When added to the dilute acids until they are neutralized, brucia forms crystallizable salts, easily obtained by evaporation. Of these, the sulphate and bisulphate, the muriate, phosphate, nitrate and binitrate, acetate, oxalate, and some others have been examined. Most of these, especially the first three or four, are very soluble in water. Its physiological effects are similar to strychnia, but it is said to possess only $\frac{1}{12}$ of the strength of that alkali. According to Dr. Fuss and Professor Erdeman, it is not a distinct alkaloid, but a compound of strychnia and resin. *Dose.* ½ gr. to 2 or 3 grs. daily, in the form of pills or solution. It is given in similar cases to those for which strychnia is prescribed: viz. paralysis, impotence, and other affections of the nervous system. It is a violent poison. Its antidotes are the same as those for strychnia. *Tests.* Nitric acid gives it a fine red color, which is removed by sulphureted hydrogen and sulphurous acid. Iodic acid, chloric acid, and chlorine, also turn it red.

BRUCINE, PILLS OF. *Prep.* Brucia 2 grains; conserves of roses and liquorice powder, of each, 1 scruple; mix and divide into 16 pills. *Dose.* 1 to 6 daily, at first, gradually increasing the dose.

BRUISES. *Treat.* These may be rubbed with a little opodeldoc or soap liniment; or if the inflammation be considerable, they may be washed with a little weak goulard water, or leeches may be applied to the part.

BRYONIN. A peculiar bitter principle, extracted from the white bryony or mandrake root. It is obtained from the expressed juice by filtration, evaporation to dryness, and re-solution in alcohol. It is a drastic purgative and poisonous. It forms a yellowish white mass.

BUBBLE AND SQUEAK, (IN COOKERY.) *Prep.* Cut slices from a cold round of beef; let them be fried quickly until brown, and put them into a dish to keep hot. Clean the pan from the fat; put into it greens and carrots previously boiled and chopped small; add a little butter, pepper, and salt; make them very hot, and put them round the beef with a little gravy. Cold pork boiled is a better material for bubble and squeak than beef, which is always hard; in either case the slices should be very thin and lightly fried.

BUGS. Various means have been proposed to drive away these noctural marauders and enemies of "*tired nature's sweet restorer, balmy sleep.*" Among the most certain of these is cleanliness. The furniture brokers put articles infested with this insect population into a room with doors and windows fitting quite close, when they subject them to the fumes of burning sulphur or chlorine In the small way, poisonous mixtures are frequently resorted to, with which the articles are washed. The following form is that usually employed:—

Corrosive sublimate and muriatic acid, of each, 1 oz.; water 4 oz. Dissolve, then add turpentine and decoction of tobacco, of each, ½ of a pint. Mix.

⁂ For the decoction of tobacco, boil 2 oz. of

tobacco in a pint of water. This mixture must be applied with a paint brush. *Caution.* This wash is a "*deadly poison!*"

The following extract may be of assistance to persons interested in the matter:—"These pests exist only in dirty houses. A careful housewife or servant will soon completely destroy them. The surest method of destruction is to catch them individually when they attack the person in bed. When their bite is felt, instantly rise and light a candle and capture them. This may be troublesome, but if there be not a great number, a few nights will finish them. When there is a large number, and they have gained a lodgment in the timbers, take the bed in pieces, and fill in all the apertures and joints with a mixture of soft soap and Scotch snuff. A piece of wicker-work, called a bug-trap, placed at the head of the bed, forms a receptacle for them, and then they may be daily caught till no more are left. Fumigations are very dangerous, and rarely effectual, therefore attempt no such project. Oil-painting a wall is a sure means of excluding and destroying them." (Chamber's Information for the People, No. 91, p. 653.)

BUNION. *Cause and Treat.* The *bunion*, or swelling on the ball of the great toe, is produced by the same cause as the corn—pressure and irritation by friction. The treatment recommended for corns will succeed in cases of bunions; but in consequence of the greater extension of the disease, the cure of course is more tedious. When a bunion is commencing, it may be effectually stopped by poulticing, and then opening with a lancet; but this requires caution, and should be performed with care.

BUNS. *Prep.* I. (*Cross Buns.*) To flour 2½ lbs., add sifted sugar ½ lb., and a little coriander seed, cassia, and mace, powdered fine, then make a paste with butter ½ lb., dissolved in hot milk ½ a pint, work in 3 tablespoonfuls of yeast and a little salt; set it before the fire for an hour to rise, then make it into buns, and again set them before the fire on a tin for half an hour; lastly, brush them over with warm milk, and bake them to a nice brown in a moderate oven.

II. (*Madeira.*) Butter 8 oz.; 2 eggs; flour 1 lb.; powdered sugar 6 oz.; half a nutmeg, grated; powdered ginger and caraway seeds, each 1 teaspoonful; work well together, then add sherry wine 1 glassful, and as much milk as required. Bake in tins in a quick oven.

III. (*Plain.*) *a.* Flour 2 lbs.; butter ¼ lb.; sugar 6 oz.; a little salt, powdered caraway and ginger; make a paste with yeast, 4 spoonfuls, and warm milk a sufficient quantity, then proceed as in No. I.

b. To the last add currants, well washed, ½ lb.

IV. (*Rich.*) Dried and warm flour 3 lbs.; powdered sugar 1 lb.; butter 2½ lbs., melted and beat with rose water 4 oz.; form into a light paste, with ¾ of a pint of yeast, and place it for an hour to rise, then add a little candied lemon and orange peel, and 1 lb. of currants, and make the whole into buns; set them before the fire for 40 minutes, then wash them over with milk, and put a little grated peel and a few caraway comfits on the top of each.

BURGLARIES, TO PREVENT. "In addition to the usual precautions of locks and bolts, alarum bells and firearms, three things have been found efficacious in preserving houses from nightly depredators. 1st. A *light* in the upper part of the house. 2d. A *small dog*, in a room on the ground floor, which offers the means of its running into a place of safety from its enemies: not to be fed too high, and allowed to sleep by day. 3d. Some *ashes* fresh from the fireplace spread before the door, underneath the window or other place. Thus the thieves' shoes will creak, the dog will be roused and bark, and the fear of detection by the approach of the light, will deter rogues of common feeling. At least, should they enter, the dog cannot be readily come at to be slain; and the scuffle occasioned by effecting this necessary prelude to robbery, will, in almost all cases, promote interruption from within or without."

BURNS AND SCALDS. These are too well known to require description.

Treat. When the injury is merely superficial, a little creosote may be applied to the part, and if it be a scald, the vesicle may be first pierced with a needle, and the aqueous fluid gently squeezed out. When creosote is not to be procured, a liniment formed with equal parts of soft soap, basilicon ointment, oil of turpentine and water may be used instead. When the part is very hot and painful, a poultice may be applied, on the surface of which a few drops of creosote, or the liniment, should be spread with a knife. This treatment will generally allay the pain, after which a dressing of any simple ointment may be adopted. In many severe flesh burns which I have had the misfortune to receive, I poured creosote *plentifully* over the part, which produced scarcely any smarting or pain, as is frequently asserted, whilst it removed the burning sensation that previously existed, and the charred surface assumed a dry scabby appearance, which, by dressing with simple ointment, soon came off and left the part beneath both sound and healthy. If a poultice be applied, it is best to keep it on until the next day, when in general a little spermaceti ointment spread on a bit of soft linen may be used instead. Plunging the part into cold water *immediately* on the receipt of an injury of this kind will frequently prevent any further remedy being necessary. In all cases of burns and scalds, it is necessary to observe that if fever should ensue, laxative medicines, as castor oil and epsom salts, should be administered.

BURNING LENS, CHEAP AND SIMPLE. Take two circular discs of plate glass, of the requisite dimensions, and place one at each end of a shallow tube; an inch long will be quite sufficient for any size; they are kept in their position very firmly by means of screw clamps, in an analogous manner to the two lenses for showing Newton's concentric colored rings. To the tube is fitted a short tube with a stop-cock attached; to the end of this tube a condensing syringe is fixed, and the cavity between the glasses filled with turpentine, varnish, bleached oil, or any other suitable substance of a high refractive power. When the glasses have attained the requisite degree of curvature, the stopcock may be shut, the syringe screwed off, and the fluid lens (for such in reality it is) mounted for use. (Chemist, iii. 50.)

BUTTER. *Qual., &c.* This article is perhaps

employed for this purpose with advantage. It is only necessary to mix the flour up with the jelly, instead of mere water, to add yeast and salt, and to bake in the common way. Dr. Percival has recommended the addition of salep for this purpose. 1 oz. of salep dissolved in 1 quart of water; 2 lbs. of flour; 80 grains of salt, and 2 oz. of yeast, gave 3 lbs. 2 oz. of good bread; but the same weight of materials, without the salep, gave only 2¾ lbs. If too much salep be added, however, it will give its flavor to the bread.

BREAD, WHITING'S, (PATENT.) This is made by dividing the dough into two portions; to the one a little carbonate of soda is added, to the other, a little dilute muriatic acid; they are both well kneaded separately, then mixed together, formed into loaves, and baked immediately. No yeast is used.

BREATH, FŒTID. Scarcely any thing is more disagreeable or disgusting than a stinking breath. Various means have been proposed to remove this annoyance, depending principally on the administration of aromatics, which by their odor might smother it for a time; but these require continual repetition, and are liable to interfere with the functions of digestion. The real cause of a stinking breath is either a diseased stomach or carious teeth; when the former is the case aperients should be administered; and if these do not succeed, an emetic may be given, followed by a dose of salts, or castor oil occasionally. When rotten teeth are the cause, they should be removed; or, if this be impossible, they should be kept clean. Dirty teeth often cause the breath to smell. The use of the tooth-brush should be a daily habit. Occasionally rinsing out the mouth with a little clean water, to which a few drops of a solution of chloride of lime, or chloride of soda, has been added, is an effective method. The following lozenges have also been recommended:—

Gum catechu 2 oz.; white sugar 4 oz.; orris powder 1 oz.; make them into a paste with mucilage, and add a drop or two of neroli. One or two may be sucked at pleasure.

BREAKFAST POWDER. *Syn.* RYE COFFEE. DILLENIUS'S DITTO. HUNT'S ECONOMICAL BREAKFAST POWDER. Rye roasted along with a little fat. *Use.* As a substitute for foreign coffee, of which it is one of the cheapest and best.

BREE'S ANTI-ASTHMATIC PLASTER. *Prep.* Simple diachylon 1 oz.; powdered camphor and powdered opium, of each ¼ oz.; sweet oil ½ a teaspoonful. *Proc.* Melt the plaster with the oil, then remove the vessel from the fire, and stir in the powders; spread it on leather before it gets cold. *Remark.* It is better made with only half the above quantity of opium.

BREWING. The art of making beer.

General notice. Before entering on a description of the process of brewing, it will be necessary to notice the apparatus and materials required for its conduct.

The apparatus consists of,

1. *A copper or boiler* capable of holding fully two-thirds of the quantity proposed to be brewed; with a gauge-stick to determine the number of gallons of fluid at any given depth therein. A copper holding about 140 gallons is a convenient size for brewing a quarter of malt.

2. *A mash-tub*, or *tun*, capable of containing rather more than the copper.

3. *One or more tuns, or vessels*, to ferment the beer in.

4. *Three or four shallow coolers* to reduce the wort as rapidly as possible to a proper temperature for fermenting.

5. *One or two copper or wooden bowls*, for bailing, &c.

6. *A thermometer* with a scale reaching from zero to above the boiling point of water.

7. *A suitable number of casks* (clean) to contain the beer.

8. *One or more large funnels, or tunners.*

9. *Two or more clean pails.*

10. *A hand-pump* of a size proportionate to the brewing.

These articles will vary in value from £10 upwards, to many hundreds, according to the extent of the brewing; but the whole of them, necessary for a private family, may be bought for less than the former amount. By proper care they will last for 30 or 40 years, and still be in a useful state. The place where these vessels are kept, and the operations carried on, is called the "*Brewhouse.*"

The materials necessary to brew beer are, *good malt, hops*, and *water*, and a little *yeast*.

The *malt* is bruised or crushed in a mill before brewing, that it may be acted on the more readily by the water. It should not be ground too small, as it would then make the wort thick; the crushed malt may advantageously lie for a few days in a cool situation, by which it will attract a considerable quantity of moisture from the air, and consequently its soluble portion will be the more easily dissolved out by the water used in mashing. Pale malt may be used coarser than amber or brown malt. A bushel of malt should make a bushel and a quarter when ground, and a quarter should yield between 9½ and 10 bushels, the quantity slightly varying according to the degree of bruising it has undergone. On the large scale, malt is ground in crushing mills, furnished with iron rollers; and on a small scale, by wooden rollers or small mills worked by hand. For private brewing, the malt is generally bought ready ground, for convenience sake. (See MALT.)

The hops should be those of the previous season, and for general purposes grown in Kent; but for the finer sorts of malt liquor, East Kent hops should be used; and where it is intended to be kept for some long time, those known by the names of *Country's*, *Alton's*, or *Farnham Hops* must be employed. The quantity of hops required to a given measure of malt varies from 2 lbs. to 8 lbs. of the former, to 1 quarter of the latter, according to the nature of the brewing. For good strong beer, 4 lbs. or 4½ lbs. is usually sufficient, but when the liquor is very strong, and it is intended to be highly aromatic, and to be kept for a long period, 1 lb. of hops may be used to every bushel of malt, or 8 lbs. to the quarter. Mild porter has about 3 lbs. to the quarter, and weak common beer has frequently only about ¼ lb. of hops to the bushel of malt. A portion of hops is also frequently added to the finer sort of beer, after it is casked, as we shall presently explain.

The water should be *soft* and *clear*, the *yeast sweet* and *good*, and all the vessels and casks both

sweet and *clean*. If this be not the case, with the latter especially, the best brewing in the world will be useless.

PROCESS OF BREWING. This may be divided into

I. *The mashing*. This operation consists in placing the ground or bruised malt in a large tub or "*tun*," known by the name of the "*mash-tun*," macerating it for some time in hot water, and lastly drawing off the wort from a hole in the bottom, over which a bunch of straw, or a strainer, or false bottom, is placed, to prevent the malt passing out along with the liquor. During the process of mashing, a peculiar principle, called by chemists *diastase*, reacts upon the starch also contained in the malt, and converts it first into a species of gum, called by the French chemists "*dextrine*," and then into a species of sugar resembling that produced by the action of sulphuric acid. The greater the quantity of starch converted into sugar in this way, the stronger and finer will be the wort. It therefore becomes a desideratum with the brewer to mash at a temperature that will most fully promote this object. It has been found that the best temperature for this purpose varies from 157° to 160°, but when more than one liquor is used, the first should be something lower than the former, the next may be between the two, and the third may slightly exceed the latter, or be about 165° or 170°. The action of the first mash is merely to extract the sugar contained in the malt already formed; that of the second to convert the starch into sugar by the action of the diastase; the third to fully complete this object, as well as to carry away the remaining portions of extract.

The mashing is usually performed by filling the copper with water, and as soon as it acquires the temperature of 145° in summer, or 167° in winter, 45 gallons are run off into the mash-tun, and 1 quarter of crushed malt gradually thrown in and well mixed by laborious working, until it becomes thoroughly incorporated and no lumps remain; the agitation is then continued for 30 or 40 minutes, when 36 gallons of water from the boiler, at a temperature of 200°, are added, and the whole again well agitated until thoroughly mixed. The mash-tun is now closely covered up, and allowed to stand for an hour or an hour and a half. At the end of this time the tap is set, and the wort is drawn off into the "underback," and generally amounts to about 50 to 52 gallons: 60 gallons of water, at a temperature of 200°, are next added to the mash-tun, previously drained well, and after being well worked, the whole is covered up as before. This mash is allowed to remain for an hour, when it is drawn off, and the malt again drained ready for the third mash. This time only 35 gallons of water are added at 200°, and allowed to stand for ½ an hour, when it is run off in the same manner as before, and the malt allowed to drain. The worts are now ready for boiling.

In some cases only the first and second mash is used for strong beer, and the third kept for table, or as water to mash a fresh quantity of malt with. In Scotland (see SCOTCH ALE) the brewer only mashes *once*, and afterwards washes his malt by frequent showers or "sparges" of water, by which he gets a wort of greater strength in proportion to its quantity. In operating as above, the average or mean temperature of the first mash is 145°, of the second 170°, and of the third 180°. In winter the mean temperature may be reckoned as 6 or 7° lower. A quarter of malt in this way will produce a wort having a specific gravity by the saccharometer of 1·234, or equal to 84 lbs. of extract. (See SACCHAROMETER.)

It is calculated that 32 gallons of the water employed in the mashing remain in the grains after the wort is drawn off.

II. *Boiling*. The wort is next transferred to the copper, and heated to the boiling point as soon as possible. In large breweries where several coppers are employed, the first mash is no sooner run into the underback, than it is transferred to the wort copper, and immediately boiled, and the successive mashings added as soon as drawn off; but in private houses, where there is only one copper, the boiling cannot be commenced until the water for the last mashing is removed. In some cases the worts are brewed separately, thus producing 2 or 3 qualities of beer, viz. *strong ale or stout, beer, and table beer*. No sooner has the boiling commenced than the hops may be added, and the boiling continued for 2 or 3 hours or more. In some breweries the beer is boiled for several hours, and in Belgium it is said that this is even continued for 10 or 12 hours, but too much boiling drives off the flavor of the hops. In general, two hours good boiling will be found sufficient. In small brewings the first wort should be sharply boiled for 1 hour, and the second for 2 hours. But if intended for beer of long keeping, the time should be extended half an hour. The hops should be strained from each preceding wort, and returned into the copper with the succeeding one. Between the boilings the fire should be damped with wet cinders, and the copper door set open.

For small-beer only half an hour is necessary for the first wort, 1 hour for the second, and 2 hours for the third.

It is reckoned that $\frac{1}{6}$ to $\frac{1}{15}$ part of the wort is dissipated in steam during the process of boiling, but this must of course depend altogether on the evaporative power of the boiler and the length of time the boiling is continued.

III. *Cooling*. The boiling being finished, the wort is run off from the copper into the hopback, which is furnished with a strainer to keep back the hops. It is then pumped into large square shallow vessels called "*coolers*," where it is exposed to a good current of air to cool it down to a proper fermenting temperature as quickly as possible. This is of the utmost importance for the success of the brewing. The wort should be laid so shallow as to cool within 6 or 7 hours to the temperature of about 60°. In warm weather, the depth should not exceed 3 or 4 inches; but in cold weather it may be 5 or 6 inches. As soon as the heat has fallen to about 60°, it should be instantly tunned and yeasted.

It is reckoned that by the joint evaporation from the boilers and coolers, there is a loss of about 40 gallons per quarter.

In private families a good way is to bring the wort from the copper in pails, and to pour it into a basket or a hamper, set over the coolers, by which means the hops will be retained, and the beer run through clear.

BOYLE'S FUMING LIQUOR. Hydrosulphuret of ammonia is usually employed and sold for this article, but the liquor prepared by Boyle's process contains an excess of sulphur. (Gay Lussac.) The properties of both are however the same.

Prep. Mix 4 parts of fresh slaked lime; 2 of sal ammoniac, and 1 of sulphur, then submit the mixture to distillation.

BRA GRAS. Tar, black rosin, and the dregs of strained rosin, melted together.

BRAIN CAKES. *Prep.* Clean, wash, blanch, and soak the brains, then beat them up with a little white pepper and salt, a sage-leaf or two, scalded and finely chopped, and the yelk of an egg; make them into small cakes or fritters, and fry them.

BRAN. The husk of wheat which immediately covers the grain, and which is left in the bolting machine. *Use.* It is largely employed by the calico printers, when diffused through hot water, to remove the coloring matter from those parts of their goods which are not mordanted. A handful mixed with a pail of warm water, forms an excellent emollient foot-bath. Infused in water, (*bran tea,*) and sweetened, it forms a popular demulcent, much used in coughs and hoarseness, and, taken in quantity, proves gently laxative. It also forms an excellent manure, and, from containing the ammoniaco-magnesian phosphate, is especially adapted for potatoes. It is frequently mixed with flour and made into bread, by the poorer orders.

BRANDY. *Syn.* Eau de Vie. Aqua Vitæ. Spiritus Gallicus. Brandy-wine. The spirituous liquor obtained by the distillation of wine. When first distilled it is colorless, and only acquires a yellowish tint from the wood of the casks, in which state it is known and sold as pale or white brandy. The deep color that it usually possesses, is imparted to it by adding a little spirit coloring, (burnt sugar or caramel,) and occasionally a little red sanders wood as well, and is intended to imitate the appearance acquired by brandy from great age, when kept in wood. The natural color, however, which the spirit receives from the cask, no matter how long it may have been in it, never exceeds an amber tint, about the common color of pale Jamaica rum; but the public taste has been gradually vitiated in this respect, until only a spirit of a lively and full "*brandy color*" (unless for a pale brandy) will sell.

The brandies most esteemed in England are imported from France, and are those of Cognac and Armagnac, the preference being generally given to the former. The brandies of Rochelle and Bordeaux may be reckoned next in quality, while those obtained from Portugal, Spain, and Italy are very inferior.

The constituents of brandy are alcohol and water, and small quantities of volatile oil, acetic acid, acetic ether, œnanthic ether, coloring matter, and tannin. It is from the presence of the last six of these substances that the spirit derives its distinguishing smell and flavor. The quantity of alcohol present in brandy varies from 48 to 55 per cent. When first imported, it is generally 1 or 2 overproof, but by age its strength is lessened, and by the time it is usually taken from the bond store for sale, seldom exceeds 3 or 4 underproof. From considerable personal acquaintance with the cognac trade, I feel confidence in asserting, that brandies of the best quality seldom exceed proof, and are generally below it, and that it is a common practice in France to add spirit of wine and coloring to raise the strength to any given point desired by the English purchaser, and to charge the same in the invoice; or where the purchaser is not *well acquainted with the subject*, and desires a strong spirit at a low rate, to sell him brandy so mixed as genuine. The very finest brandies average from 5 to 10 u. p., and never exceed about 2 u. p.; they then contain more than ½ their weight of water, and from their boiling point being higher, they come over more highly charged with essential oil, and other volatile and fragrant principles of the grape, and thus possess in a greater degree that peculiar aroma and flavor for which they are so much esteemed. French brandy or wine, distilled at a low temperature in a water bath, yields a very pure and scarcely flavored spirit.

The quality of the brandy imported from France varies considerably from that which is drunk on the continent, principally from its being *prepared*, or, as it is technically termed, "*made up,*" for the London market, which means lowering it by the addition of spirit, coloring, &c. above described. The common strength at which foreign brandy is sold in England is about 11 or 12 u. p., and below 17 u. p. it becomes seizable by the excise. The strength at which it is sold and permitted in trade, is generally 10 u. p., to which it is reduced by adding water, and never less than 12 u. p., unless it be specially agreed upon. In large quantities and from bond, of course the strength depends much upon the age and quality of the spirit. A fine old brandy being, perhaps, 8 or 10 *u. p.*, while one of the last year's vintage of a commoner quality may be as strong as 2 or 1 *u. p.* But these distinctions are familiar to every experienced brandy dealer.

In France there are several varieties of this spirit distilled, which are known by names descriptive both of their quality and source. The "*eau de vie supérieure,*" or *cognac brandy*, is generally obtained from pale white wines, by careful distillation, and is remarkable for its superior flavor. When kept in glass or stone bottles, it is called white cognac brandy, and the same term is also generally applied when it has been kept in casks, but has not been artificially colored; in the latter case, however, it generally acquires a pale amber tint.

The "*eau de vie ordinaire,*" or *common brandy*, is distilled from high-colored white or red wines, and has generally a sp. gr. of 0·948, and varies from 22 to 27 u. p.

The "*eau de vie de marc*" is obtained from the lees of vinegar and other wines, the marc or cake of grapes from which the juice has been pressed, and the commonest red wines, fermented and distilled together by a quick fire, to drive over as much essential oil and flavoring as possible.

The "*eau de vie seconde*" is the weak spirit that passes over after the stronger spirit has been drawn off, and the receiver changed. *It is used* for common drinking, or mixed with other brandy.

The "*eau de vie à preuve d'Hollande*" is brandy about 19° Baume, or sp. gr. ·9420, the common strength at which it is retailed in France, and will stand the "*proof*" or "*bead*"

The "*eau de vie à preuve d'huile*" is the strongest brandy usually drunk; it is about 23° Baume, or sp. gr. ·918; pure olive oil will just sink in it; hence the above term.

The "*eau de vie fort*" is usually prepared by the redistillation of common brandy, keeping the first portion separate. It answers to our spirit of wine. It is made of 12 different strengths, distinguished by names, exhibiting the quantity of water required to reduce the sample to the "*preuve d'Hollande.*" The weakest is called cinq-six, or $\frac{5}{6}$, and the strongest trois-neuf, or $\frac{3}{9}$, the difference between the numerator and the denominator being the quantity of water the 3 parts of the former will take to reduce it to the "*preuve,*" when it would make 9 parts. Its sp. gr. is about ·839.

The *esprit de vin* is brandy or spirit rectified to 0·890 and upwards.

The general method of distilling brandy in France differs in no important particular from that practised in England, for grain or molasses spirit. Neither are the French workmen more skilful nor more cleanly in their operations than the English. It is the materials alone that, in this case, conduce to the superiority of the product. The quality of the brandy varies with that of the wine from which it has been distilled. Every soil, every climate, every kind of grape, produces a wine possessing some peculiarity confined to itself, and this wine on distillation produces a spirit possessing like distinctions. A large quantity of brandy is prepared in France soon after the vintage, as the juice of the poorer grapes that is unfit for wine is fermented and at once distilled. It is a general rule, in France, to distil only such wines as are unsaleable, as the profits on the wine, sold as such, are much greater than when it is converted into brandy.

The Strength of Brandy may be ascertained in the same way as alcohol, for which purpose Sike's hydrometer is used in England. In France, from the value of spirit being less, it is frequently tested by simpler methods, though great accuracy obtains, in this particular, where necessary.

Pur. Very little perfectly pure French brandy is obtained by the small consumer in England, as it is not only generally lowered a little by the wholesale dealer, but undergoes a like process at the hands of the retailer. The safest method is either to procure it direct from the bond store, without its even entering a private cellar, or to buy of some known respectable party, and to pay a price that will offer no inducement to dishonesty. If this be not done, by all means buy British brandy, which is now made of excellent quality by many of the leading houses, as *Betts, Bretts, Booth,* and *Grimble.* From the two former a single sealed bottle may be procured at the same price as by the gallon.

The importation of foreign brandy for home consumption amounts to about 1,400,000 gallons a year.

BRANDY, (REDUCED.) I. To 20 gallons of Cognac brandy add 5 gallons of the best British brandy.

II. To 72 gallons of full-flavored French brandy, add 10 gallons of spirit of wine, (58 *o. p.,*) 8 gallons of water, and 1 pint of good coloring. Rummage well up and let it stand until the next day.

Remarks. The above reduction is generally adopted in trade, and is known by the name of "*improving.*" But such is the poverty of the palate of the English brandy drinker, that the adulteration is often not suspected, even when it is carried to double the extent of the above, which is generally exceeded in the hands of the retailer. So long, however, as the foreign spirit constitutes about half of the mixture, and was at first of decent quality and age, the infatuated Englishman smacks his lips, and cunningly holding up his glass between the light and his eye, exclaims, "*Ah! this is a drop of the real.*"

BRANDY, (BRITISH.) *Syn.* British Cognac. Imitation Cognac, &c. From the heavy duty levied on French brandy imported into England for home consumption, it has become a desideratum with the distiller (rectifier) to produce an English spirit of a similar description. For some time the attempt proved quite unsuccessful, but of late years much capital and talent have been embarked in the pursuit, and the result has proved very satisfactory. An article of British manufacture may now be purchased, at a very reasonable rate, of really respectable quality, and possessing much of the flavor and aroma of foreign brandy, while, as a beverage, it is equally wholesome. Much of the British brandy, however, that is commonly met with, is of such a wretched quality as to be quite undeserving of the name, which is evidence of the fact, that much skill and experience is required to ensure success in its manufacture. For a long time this liquor was distilled from spoilt wine and dregs of wine, both British and foreign, mixed with beer bottoms and similar articles; and when, instead of these, corn, malt, and molasses spirit were employed, it was considered as an unpardonable and wicked misuse of those articles. Modern experience has proved, however, that perfectly pure and tasteless malt spirit is the best article to form into an imitation brandy.

The following formulæ, by skilful management, will produce very good brandy, but it must be recollected that much depends on the quality of the materials employed, as well as on the operator. As the strength and quality of the ingredients, and the methods of manipulation vary, so will the result; much must therefore be left to the judgment and discretion of the artist. It offers a profitable pursuit to the ingenious and industrious chemist and rectifier.

Prep. I. Take 12 gallons of the finest flavorless malt spirit at proof, (or if of a different strength a proportionate quantity;) add thereto 5 gallons of water, $\frac{3}{4}$ lb. of the best crude red tartar or winestone, previously dissolved in 1 gallon of boiling water; $\frac{1}{4}$ pint of acetic ether; 2 quarts of good French wine vinegar; 7 lbs. of bruised French plums, and 1 or 2 gallons of wine bottoms or flavor stuff from Cognac, mix them in a fresh-emptied sherry cask, and let them stand together for 14 days, frequently rummaging up the liquor with a stick; next draw over 15 gallons of the mixture from a still furnished with an agitator. Put the rectified spirit into a clean, fresh-emptied Cognac brandy cask, and add thereto $\frac{3}{4}$ pint of tincture of catechu, 1 lb. of fresh and clean oak shavings, and about a pint of good spirit coloring. Bung close, and agitate occasionally for a few days. *Remarks.* Age improves the above article, and renders it

"Metallic spoons are used when the substance to be examined is intended to be exposed to the action of heat only, and might undergo some change by immediate contact with the charcoal. When the spoon is used, the flame of the blowpipe should be directed to that part of it which contains the substance under examination, and not be immediately applied to the substance itself. The handle of the spoon may be inserted into a piece of charcoal; and if a very intense heat is required, the bowl of the spoon may be adapted to a hole in the charcoal. Small portions may be taken up by platina forceps. Salts and volatile substances are to be heated in a glass tube closed at one end, and enlarged according to circumstances, so as to form a small matrass."

When the behavior of the substance has been observed in this way, it is melted with various fluxes, as microcosmic salt, borax, &c., and their action examined, both in the interior and exterior flame, by which means its composition may be generally ascertained, by reference to any work on mineralogy.

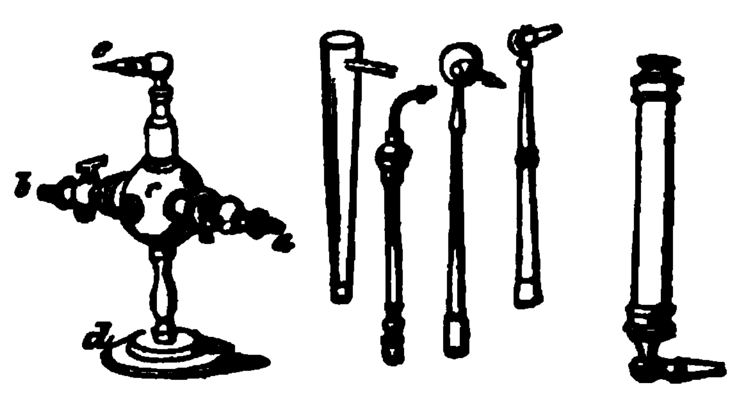
Beginners are usually unable to maintain a continual stream of air from the jet, which is, however, very simple to accomplish. The operation depends upon a little artifice in blowing through the pipe, which is in reality more difficult to describe than to acquire. "The effect intended to be produced is a continual stream of air for many minutes, if necessary, without ceasing. This is done by applying the tongue to the roof of the mouth, so as to interrupt the communication between the mouth and the passage of the nostrils; by which means the operator is at liberty to breathe through the nostrils, at the same time that by the muscles of the lips he forces a continual stream of air from the anterior part of the mouth through the blowpipe. When the mouth begins to be empty, it is replenished by the lungs in an instant, while the tongue is withdrawn from the roof of the mouth, and replaced again in the same manner as in pronouncing the monosyllable *tut*. In this way, the stream may be continued for a long time without any fatigue, if the flame be not urged too impetuously; and even in this case no other fatigue is felt than that of the muscles of the lips." (Ure.)

For producing extreme degrees of heat, the flame is blown with a jet of oxygen gas, and the instrument is then called an "*oxygen blowpipe;*" or a mixture of oxygen and hydrogen is burned, when it is called an "*oxy-hydrogen*" blowpipe. The heat produced by the last is so great that no substance can stand before it. The most refractory native compounds, as rock crystal, quartz, flint, chalk, plumbago, &c., are immediately fused. Gold is volatilized, and iron is rapidly consumed the instant it is placed in the flame. To use this wonderful instrument with safety, and to prevent an explosion, a peculiarly constructed jet is required. The principal blowpipes in general use are figured in the accompanying engravings. The shape of the common blowpipe adopted by the experimentalist may depend upon the fancy of its employer.

This apparatus is also furnished with valves and springs.

Beside the following there are several other va-

1 2 3 4 5 6



1, Oxy-hydrogen blowpipe.
2, Black's do.
3, Bergman's do.
4, Pepy's do.
5, Wollaston's do.
6, Hemming's safety jet for the oxy-hydrogen ditto.

a, Pipe conveying oxygen gas.
b, Do. do. hydrogen gas.
c, Ball stuffed with fine wire gauze.
e, Jet, (internal diameter 1-80th of an inch.)

rieties of blowpipes, in which the air is expelled by the pressure of a column of water, (hence called "*hydrostatic blowpipes,*") or the flame blown with the vapor of boiling alcohol, ("*spirit blowpipe.*")

Use. The blowpipe is of most extensive application in qualitative analysis, especially of minerals, and its use cannot be too highly recommended to the young chemist.

For further information on this subject the reader is referred to Gahn on the Blowpipe; to Ure's Dictionary of Chemistry; to Campbell's Translation of Kobell's Instructions for the Discrimination of Minerals; and to the Chemist, iv. 462.

BLUBBER. This substance, which is so plentiful on some parts of the coast of England, forms a very rich manure for pasture and arable land, when used at the rate of 1 ton to every 20 or 30 loads of mould, together with a chaldron of lime per acre. It must be well turned over, and after lying 3 or 4 months the land will be in prime condition.

BLUE, CHARCOAL. *Prep.* Triturate carbonized vine stalks with an equal weight of potash, then put it into a crucible and place it over the fire, until the mixture ceases to swell, keeping it well stirred all the time; next allow it to cool, dissolve it in water, and saturate the excess of alkali with dilute sulphuric acid; the liquid becomes blue, and a dark precipitate falls down, which turns of a brilliant blue color when dried and heated.

BLUE, COBALT. *Prep.* I. Dissolve Zaffre 1 lb. in $\frac{3}{4}$ lb. of nitric acid, diluted with an equal weight of water, by digestion for some hours, evaporate nearly to dryness, then dissolve in warm water, filter and add a solution of phosphate of soda as long as any precipitate falls down; collect this on a filter and wash it with cold water, then mix it while still moist with 8 times its weight of freshly precipitate hydrate of alumina, also well washed and still moist. Stir them together until dry; lastly, expose the mixture to a cherry red heat in a crucible, after which cool the mass, and reduce it to a fine powder.

II. Precipitate a solution of nitrate of cobalt as above, and proceed as before.

III. Make a strong solution of neutral nitrate

of cobalt, and mix it with pure moist alumina, then dry it and proceed as before.

IV. Precipitate a solution of nitrate of cobalt with ammonia alum, collect the precipitate, wash, dry, and heat it to a cherry red as before.

Use. A beautiful blue pigment, very permanent.

BLUE, CHEMIC. *Syn.* SAXON BLUE. LIQUID BLUE. SULPHATE OF INDIGO. *Prep.* I. Indigo 1 lb.; oil of vitriol 8 lbs. *Proc.* Put the acid into an earthenware pan, placed in a tub of water to keep it cool, and add the indigo, previously reduced to fine powder, in small successive portions, carefully stirring to prevent it *heating*. When all the indigo has been added, cover up the vessel and let it stand for 4 hours, occasionally stirring it during the time; lastly, dilute it with an equal weight of water.

II. Indigo 1 oz.; oil of vitriol 4 oz.; dissolve as before; the next day add 1 oz. of dry potash; let it stand a day longer, then dilute it with 12 oz. of water.

Use. In dyeing greens and blues, either without preparation or with a mordant of alum and tartar.

BLUE, CHINA. *Syn.* ROYAL SMALTS. *Prep.* Grind together oxide of cobalt or zaffre, with an equal weight of potash, and 8 times its weight of feldspar. Then submit the mixture to fusion in a crucible. *Use.* To paint pottery, and as a pigment.

BLUE, IRON. *Prep.* Precipitate a filtered solution of protosulphate of iron, with another of phosphate of soda. Collect the powder, wash and dry it. *Use.* A lively sky-blue.

BLUE, MOLYBDENUM. *Prep.* Dissolve sulphuret of molybdenum in nitric acid, then add some tin filings and a little muriatic acid. After digestion for some time, pour off the clear and evaporate to dryness. Mix the powder thus obtained with moist hydrate of alumina, as in making cobalt blue, and heat it to nearly a dull red.

BLUE, MOUNTAIN. Carbonate of copper, mixed with earthy matter.

BLUE, SAXON. *Prep.* Dissolve 1 oz. of sulphate of iron and 8 oz. of alum in 1 gallon of water, then add simultaneously, separate solutions of prussiate of potash and common pearlash, until they cease to produce a precipitate; lastly, allow the liquid to deposite, decant the clear portion, wash the remainder well with water, and dry it. Or a solution of the sulphate of iron may be first made and precipitated with the prussiate of potash, and instantly mixed with the solution of alum and a solution of pearlash, added until it ceases to produce a precipitate.

BLUE, SUPERB LIQUID. *Prep.* Put into a small matrass or common vial 1 oz. of pure Prussian blue reduced to powder, and pour over it from 1½ oz. to 2 oz. of concentrated muriatic acid. The mixture produces an effervescence and the prussiate soon assumes the consistence of thin paste. Leave it in this state for 24 hours, then dilute it with 8 or 9 oz. of water, and preserve the color thus diluted in a bottle well stopped.

The intensity of this color may be lessened, if necessary, by new doses of water. If the whole of this mixture be poured into 1 quart of water, it will still exhibit a color sufficiently dark for washing prints.

BLUE, STONE. *Syn.* FIG BLUE. THUMB BLUE. KNOB BLUE. CROWN BLUE. MECKLENBURG BLUE. QUEEN'S BLUE. *Prep.* Mix finely powdered indigo with starch paste until a proper color be produced, then make it into small lumps. II. Instead of starch use whiting and a little weak size. *Use.* Employed by laundresses to give a faint blue tinge to linen.

BLUE DYE. *Proc.* First give the goods a mordant of alum, then rinse them well and boil them in a bath of logwood, to which a small quantity of blue vitriol has been added.

II. Boil in a bath of logwood, then add 1 oz. each of tartar and verdigris to every pound of logwood employed, and boil again.

III. Bilberries, elder-berries, mulberries, privet-berries, and several other vegetable blue substances, may be used to dye blue as above instead of logwood.

Remarks. By increasing the proportion of alum the color verges on purple, and by employing a little acetate of iron or green copperas, the darker shades are produced. Verdigris, blue vitriol, and alkalis turn it more on the blue, and a mordant of tin imparts a violet cast. None of these dyes, however skilfully managed, are so permanent as those produced with indigo and Prussian blue. (See INDIGO, PRUSSIAN BLUE, and DYEING.)

BOARDS, MARBLE, &c., TO TAKE OIL AND GREASE OUT OF. I. Make a paste with fuller's earth and hot water, cover the spots therewith, let it dry on, and the next day scour it off with soft or yellow soap.

II. Make a paste with soft soap, fuller's earth, and a little pearlash, and use it as above.

III. Make a paste of fresh slaked lime, water, and pearlash, and use it as above. *Remarks.* Observe not to touch the last mixture with the finger, as it is very caustic unless it be largely diluted with water.

BOERHAAVE'S RULES FOR PRESERVING HEALTH.

"Keep the feet warm;
The head cool; and
The body open."

These rules are very concise, and convey directions which, though valuable, are too often neglected.

BOILING POINT. The boiling point of water may be raised considerably above 212° Fahr. by the addition of saline matter. Thus, 60 parts of dry acetate of soda added to 40 of water raise the boiling point to 256° Fahr., and 30 parts of muriate of soda added to 70 of water raise it to 224 Fahr. As in practice, however, it proves inconvenient to employ a saturated solution for a bath, from the evaporation of the water continually inducing the salt to crystallize, it is usual to keep it considerably below that point. By means of such solutions the chemist is enabled to evaporate fluids and desiccate solids at any required temperature. The boiling point of baths containing different salts may be seen below.

TABLE of the Boiling Points of several Saline Solutions, abridged from the Table of Mr. T. GRIFFITHS. (Jour. Science, xviii. 89.)

Names of Salts.	Dry Salt in 100.	Boiling Point.
Acetate of soda, . . .	60	256° F.
Nitrate of soda, . . .	60	246
Rochelle salt, ...	90	240
Nitre, ...	74	238
Muriate of ammonia, .	50	236
Tartrate of potash, . .	68	234
Muriate of soda, . . .	30	224
Ditto, ...	20	218·75
Muriate of lime, . . .	40	216·5
Sulphate of magnesia, .	57·5	222
Supersulphate of potash,	?	222
Borax, ...	52·5	222
Phosphate of soda, . .	?	222
Carbonate of soda, . .	?	220
Muriate of baryta, . .	45	220
Alum, ...	52	220
Sulphate of potash, . .	17·5	215
Bitartrate of potash, .	9·5	214
Sulphate of soda, . .	31·5	213

Remarks. From 5 to 9 degrees are usually lost by passing through the vessel, depending on its thickness and materials. The boiling point of water in glass vessels, under common circumstances, varies from 212·54° to 215·6°, and in perfectly pure and smooth glass vessels, water may be heated to 221° F. without boiling. (M. F. Marcet.)

BOILS. *Treat.* When these appear, suppuration should be promoted by poultices of bread and linseed meal, to which a little fat or oil may be added, to prevent their getting hard. When poultices are inconvenient, exposure to the vapor of hot water, or the application of stimulating plasters, may be adopted instead. When sufficiently ripe, the matter should be evacuated, and the wound dressed with a little simple ointment spread on a piece of clean lint or linen. The diet may be full and liberal until the maturation of the tumor and the discharge of the matter, when it should be lessened, and the bowels opened by some saline purgatives, as salts or cream of tartar. When there is a disposition in the constitution to the formation of boils, the bowels should be kept regular, and tonics, as bark or steel, taken, with the frequent use of sea-bathing, if possible.

BOLAS. *Prep.* Into 2 lbs. of flour pour ¾ pint of warm milk, a small teacupful of yeast, and 6 eggs; make them into a dough, add 1 lb. of butter, by degrees, and let it rise for 1 hour, then mix in 1 lb. of powdered sugar, and make the mass into cakes; put these into cups or tins previously well buttered, and ornament the top with candied orange or lemon peel; lastly, bake them.

BOLUS OF ALUM. *Prep.* Powdered alum and conserve roses, of each 15 grs.; sirup of orange peel or saffron to mix. *Used* in fluxes, &c.

BOLUS OF MUSK. *Prep.* I. Musk 15 grs.; camphor 5 grs.; powdered gum 3 grs.; mix with sirup of saffron. *Use.* In convulsions and typhus fever.

II. Musk and carbonate of ammonia of each 10 grs.; conserve of roses q. s.; to make a bolus. *Use.* Sometimes given every three hours in mortification accompanied with spasms.

BOLUS, PURGING, (FOR DOGS.) *Prep.* Jalap and rhubarb, of each 15 grs.; ginger 4 grs.; soap 10 grs.; water q. s.; if this does not open the bowels, add aloes half a drachm, or 3 or 4 grs. of calomel. *Use.* In the distemper; it must be preceded by copious bleeding, and abstinence from food for a day or a night.

BOLUS OF SULPHATE OF ZINC. *Prep.* Sulphate of zinc 20 to 25 grs.; conserve of roses q. s. to make a bolus. *Use.* As an emetic where poison has been taken, to be followed by copious draughts of warm water or weak tea.

BOLETIC ACID. An acid discovered by Braconnot in the juice of the boletus pseudo-igniarius.

Prep. Concentrate the expressed juice to a sirup by means of a gentle heat, then digest it in strong alcohol, and dissolve the residuum in water; add a solution of nitrate of lead as long as any precipitate falls, which must be washed with water, diffused through water in a tall glass vessel, and in this state a current of sulphureted hydrogen must be passed through it, until the lead is thrown down; filter, evaporate, and crystallize; lastly, purify by resolution and crystallization from alcohol.

Remarks. This acid dissolves in 45 parts of alcohol and 180 of water, and is volatile. It is doubtful whether it be a distinct acid principle.

BOLOGNA VIAL. The bologna, or philosophical vial, is a small vessel of glass which has been suddenly cooled, open at the upper end, and rounded at the bottom. It is made so thick at the bottom that it will bear a smart blow against a hard body without breaking; but if a little pebble, or piece of flint, is let fall into it, it immediately cracks, and the bottom falls into pieces; but unless the pebble or flint is large and angular enough to scratch the surface of the glass, it will not break.

BOLOGNIAN PHOSPHORUS. *Syn.* BOLOGNIAN STONE. This is a phosphorescent stone that once excited great attention. It was accidentally discovered by a shoemaker of Bologna in the 17th century. A family of the name of Logani, who were very successful in making it, acquired a large fortune by selling it to the curious throughout Europe.

Prep. Powder native sulphate of baryta that has been previously ignited, and make it into a paste with mucilage of gum arabic; roll this into pieces a quarter of an inch thick, and dry them in a moderate heat; then expose them to the heat of a wind furnace by placing them loose among the charcoal.

Prop., Use, &c. Placed in a vial and exposed for a few minutes to the sun's rays, it will give light enough in the dark to see the figures on the dial-plate of a watch.

BOMBIC ACID. An acid which M. Chaussier extracted from the silkworm in 1781. It has since been found not to be a distinct acid.

BON-BONS. *Prep.* Provide leaden moulds, which must be of various shapes, and be oiled with oil of sweet almonds. Take a quantity of brown-sugar sirup in the proportion to their size, in that state called a *blow*, which may be known by dipping the skimmer into the sugar, shaking it, and

flowing through the holes, when parts of light may be seen; add a drop of any esteemed essence. If the *bon-bons* are preferred white, when the sugar has cooled a little, stir it round the pan till it grains, and shines on the surface; then pour it into a funnel and fill the little moulds, when it will take a proper form and harden: as soon as it is cold take it from the moulds; dry it for two or three days, and put it upon paper. If the *bon-bons* are required to be colored, add the color just as the sugar is ready to be taken off the fire.

BONES. The bones of animals are employed for various purposes in the arts, manufactures, and domestic economy. (See the succeeding articles.)

BONE ASH. *Syn.* Impure Phosphate of Lime. *Prep.* Calcine bones to whiteness, and reduce the ash to fine powder. *Use.* To make pure phosphate of lime, and to form cupels. It is sold for burnt hartshorn.

BONE BLACK. *Syn.* Animal Charcoal. Ivory-Black. Bones burnt in close vessels.

Prep. On the large scale, two different processes are adopted to produce bone black.

I. (*From bones as the sole product.*) The bones broken to pieces are put into small cast-iron pots of the shape of the engraving, and varying from

$\frac{3}{8}$ to $\frac{1}{2}$ an inch in thickness. Two of these being filled, are dexterously placed with their mouths together and then luted with loam. A number of vessels, thus prepared, are placed side by side and over each other, in an oven resembling a potter's kiln, to the number of 100 to 150. The fire is then kindled, and the heat kept up strongly for 10 or 12 hours, according to circumstances, until the process is completed. The whole is allowed to cool before opening the pots.

II. (*The residuum of the manufacture of Bone Spirit.*) The bones are here introduced into retorts similar to those used at the gas works, and heat being applied, the volatile products are conveyed away by iron pipes to cisterns where its condensable portion is collected. As soon as the process of distillation is finished, the solid residuum in the retorts, while still red hot, is removed through their lower ends into wrought-iron canisters, which are instantly closed by air-tight covers, and luted over. These are then raised to the ground by a crane and allowed to cool.

Remarks. Previously to distillation or calcination, the bones are boiled for their grease, which is sold to the candle and soap makers. They are then sorted, the finest pieces being selected for making handles for knives, tooth-brushes, buttons, &c.; the next sort for making into bone black; while the smallest and worst description is reserved for grinding into manure. The bones lose about $\frac{1}{2}$ their weight by the process of burning. After this they are ground in a mill, sorted by sieves into two kinds, one *granular*, somewhat resembling gunpowder, and the other *quite fine*. The one is sold under the name of *animal charcoal*, for decoloring liquors, the other as a *pigment*. This article possesses the valuable property of taking lime from sirups, at the same time that it decolors them. Its power as a decolorizer may be tested by adding it to a solution of brown sugar or molasses, or water containing $\frac{1}{1000}$ part of indigo dissolved in sulphuric acid. The test should be made in a small glass tube. By well washing and careful reburning, this charcoal may be used any number of times as a decolorizer.

BONES AND IVORY, DYES FOR. 1. (*Red.*) *a.* Make an infusion of cochineal in water of ammonia, then immerse the pieces therein, having previously soaked them for a few minutes in very weak aquafortis and water.

b. Boil the bones with 1 lb. of Brazil dust, in 1 gallon of water, for 3 hours, then add $\frac{1}{4}$ lb. of alum and boil for 1 hour more.

2. (*Black.*) *a.* Immerse the pieces in a weak solution of nitrate of silver, for a short time, then expose them to the sunlight.

b. Steep for 2 or 3 days, in a decoction made with 1 lb. of galls and 2 lbs. of logwood, then steep for a few hours in iron liquor, (acetate of iron.)

3. (*Green.*) *a.* Steep in a solution of verdigris to which a little aquafortis has been added.

b. Dissolve distilled verdigris in weak vinegar, and steep the pieces therein.

c. Steep in a solution of 2 parts of verdigris, and 1 of sal ammoniac. *Observe* not to use a metallic vessel for the above.

4. (*Purple.*) *a.* Steep in a weak solution of terchloride of gold.

b. Boil for 6 hours in a decoction of 1 lb. of logwood in $\frac{1}{2}$ gallon of water, adding more water, as it wastes by boiling, then add 2 oz. of alum, and boil for 1 hour more.

5. (*Yellow.*) *a.* Boil for 1 hour in a solution made with 1 pound of alum in 1 gallon of water, then take out the pieces and steep them in a decoction made with $\frac{1}{2}$ lb. of turmeric in 2 quarts of water; lastly, mix the two liquors and boil them therein for 1 hour.

b. Steep the pieces for 24 hours in a solution of sugar of lead, then take them out, and when dry, immerse them in a solution of chromate of potassa.

c. Dissolve as much of the best orpiment in water of ammonia or hartshorn, as it will take up, then steep the pieces therein for twenty-four hours; lastly, take them out and dry them, when they will turn yellow. *Remark.* By diluting the solution with water, any shade of yellow may be made.

6. (*Blue.*) *a.* Stain them green, then steep them in a hot and strong solution of pearlash.

b. Boil them in a strong decoction of logwood, and afterwards steep them in a solution of blue vitriol.

c. Steep them for a short time in a weak solution of sulphate of indigo, to which a little salt of tartar has been added; or, still better, boil them in a dyer's green indigo vat. *Remarks.* The bones of living animals may be dyed by mixing madder with their food. The bones of young pigeons may thus be tinged of a rose color in 24 hours, and of a deep scarlet in 3 days; but the bones of adult animals take a fortnight to acquire a rose color. The bones nearest the heart become tinged soonest. In the same way extract of logwood will tinge the bones of young pigeons purple. (Mr. Gibson.)

BONE GREASE. *Prep.* By bruising and boiling the refuse bones of the kitchen, and skimming the broth when cold, from $\frac{1}{4}$ (?) to $\frac{1}{5}$ of their

weight of good fat may be obtained, fit for culinary purposes when fresh, but always excellent for making soap and candles. (Proust.)

BONE GLUE. *Syn.* GELATINE. *Prep.* This is made by dissolving out the earth of bones, previously boiled for the grease, washing the remaining jelly with water, then boiling it with a little water, and forming it into cakes for sale. (SEE GLUE.)

BONE MANURE. For this purpose the bones are ground to a coarse powder in a mill, and sowed along with the seed in a drill. It is said that wheat thus treated yields 30 to 50 per cent. more in weight of straw and grain than by the common methods. It is usually applied to light or turnip soils, which it renders more than ordinarily productive. Bone manure is much used in the west of Yorkshire, Holderness, and Lincolnshire. The usual quantity per acre is 70 bushels, when used alone; but when mixed with ashes, as common manure of any sort, 30 bushels per acre is thought quite enough. It is applied at the same periods as other manure, and has been found in this way to remain 7 years in the ground. The rough part of this manure, after being 5 years in the ground, has been gathered off one field and thrown upon another of a different soil, and has proved, even then, good manure.

BONES, (IN COOKERY.) The bones of good meat form most excellent materials for making soups and gravies, as is well known to every good cook. In France, soup is extensively made by dissolving bruised bones in a steam heat of 2 or 3 days' continuance, and also by dissolving out the earthy part by digestion in weak muriatic acid, when a lump of gelatine is obtained, which after being well washed with water will dissolve by boiling, and is equal to isinglass for all the purposes of making soups and jellies. Proust has recommended the following process for making the best of bones, in hospitals, jails, and similar establishments:—Crush the bones small, then boil them for 15 minutes in a kettle of water, cool, and skim the fat off, which varies from $\frac{1}{6}$ to $\frac{1}{4}$ (?) of the weight of the bones employed, and when fresh is fit for all common purposes. The bones are then ground, and boiled in 8 to 10 times their weight of water, of which that already used must form a part, until $\frac{1}{2}$ is wasted, when a very nutritious jelly is obtained. A copper vessel should not be used, as the jelly acts upon this metal. An iron Papin's digester is the most suitable. The bones of boiled meat are nearly as productive as those of fresh meat, but roasted meat bones scarcely afford any jelly. (Dr. Young.) As boning meat before cooking is now a very general practice, a quantity of fresh bones may always be had.

BONE SHAVINGS. *Syn.* BONE DUST. BONE TURNINGS. These yield a beautiful jelly by boiling with water, nearly equal to that produced from hartshorn shavings, for which they are very frequently sold.

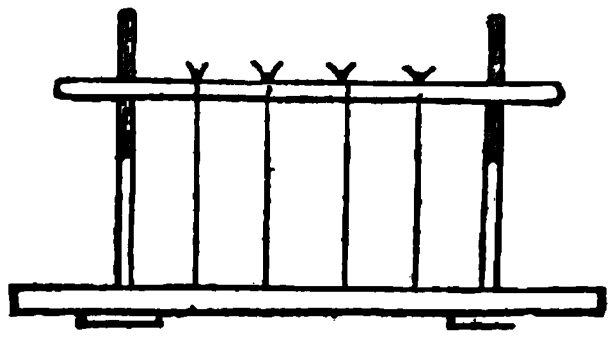
BOOKBINDING. The process of binding books may be divided into several distinct operations, which, in large establishments, are usually performed by different persons, such a method being found to produce greater expedition and better work, than when the whole is done by one person.

The sheets received from the hands of the printer are—

1. *Folded*, which is done correctly by observing the marks or catchwords at the bottom of the pages. As the sheets are folded they are laid upon each other in proper order, and are ready to undergo—

2. *The operation of beating.* This is performed by laying them upon a large stone, and striking them with a heavy smoothed-faced hammer, or by passing them through a rolling press. The former method is usually adopted in the small way, and the latter on the large scale.

3. *The sheets are next fastened to bands*, which is done by taking the folded sheets up one by one, and sewing them to pieces of cord, stretched in a little frame screwed or fastened to the counter or table, called the sewing-press. (See eng.) The



number of bands used, is generally 6 for a folio, 5 for a quarto, and so on proportionally, less than 4 seldom being employed even for small sizes. The ends of the cords being cut off to within about 2 inches of the back, the sheets are ready for—

4. *Glueing.* The back being knocked into shape with a hammer, and the sheets placed in the cutting press, which is then slightly screwed up, melted glue is thinly and evenly applied. After a short time the book is removed from the press, and the back properly adjusted with a hammer, when it is again put into the cutting press, where it is screwed up very tight, and is then ready for—

5. *Cutting.* The instrument employed for this purpose is of a peculiar shape, and called a plough or plough-knife.

6. *Affixing the boards. The bands* are now scraped out fine at the ends, and the pasteboard to form the covers is fastened thereto, and is then properly adjusted, and shaped with a large pair of shears. The edges now undergo the operation of—

7. *Sprinkling*, or other adornment. The first is performed by a stiff brush of hog's bristles, dipped in the color; the brush being held in the one hand, and the hairs moved with the other.

8. *The external covering of leather, fancy cloth, or paper*, is now applied, having been previously well soaked in paste, to make it properly adhere. One or more of the blank leaves of the book are next pasted against the inside of the cover, to screen the ends that are turned over, when the book is finished; or for choice work, is handed to a "*finisher*" for—

9. *Lettering, gilding, &c.* Gold-leaf is applied by means of white of egg, the pattern being given by pressure with heated brass tools, having the design or letters on their surfaces. The whole is then glazed over and polished.

Remarks. The succession of some of the above operations sometimes varies with the workmen and

the nature of the binding. The above must therefore only be regarded as a short and general outline of the process. If the reader will accompany the perusal by an examination of a bound book, the whole will be rendered quite familiar.

The following varieties of binding may be noticed:

a. Boards. A book, loosely done up without cutting the edges, and covered with paper or cloth, is said to be in boards.

b. Cloth-binding. This style of binding is that in which the majority of works are now issued. It admits of great neatness and even beauty, and is very durable and cheap. *Proc.* The prepared cloth, cut by a pattern to the size suited to the volume, is passed rapidly through a rolling press, between engraved cylinders of hardened steel, which print the pattern in relief. Paste is now applied to the cloth, when it is placed over the volume, previously prepared to receive it. Books in cloth-binding are not commonly cut at the edges, unless highly finished.

c. Dutch binding. This species of binding is distinguished by the backs being of vellum.

d. French binding. This consists in pasting a piece of parchment over the back of the book, between each band, and pasting the ends upon the inside of each cover.

e. Half-binding. Books forwarded in boards, and finished with leather backs and corners, are called "*half-bound.*"

f. Hancock's patent binding. In this method the sheets are folded in double leaves, and being properly placed together and adjusted, the book is subjected to the action of a press, and a strong solution of Indian rubber is smeared over the back with the finger. The operation is repeated, as often as necessary, when fillets of cloth are cemented on with the varnish, and the book is ready to have the boards attached. Thus several of the common operations of binding are dispensed with. I willingly bear testimony to the strength and durability of this method, and the great convenience it affords in allowing the books to open perfectly flat upon a table, or to be distorted in any possible manner, without injury to their backs. It is the best way of binding books for travellers. I once had a large trunk of books, among which was one bound on Hancock's plan. All the rest were nearly torn to pieces by a few months' journey, but this one was uninjured.

g. Law binding. A strong method applied to law books.

h. Leather binding. *Proc.* Immerse the leather in water; after which wring it, and stretch it on a board; place the book with the boards extended thereon, and cut out the cover, allowing about half an inch larger than the book, to turn over the inside of the pasteboards. Pare the edges of the cover very thin all round on a marble slab, and paste it well; glue the back of the book, and spread the cover on the board.

Let the pasteboards be properly squared and even; put the book on the cover, which draw on very tight. Rub the cover smooth with a folding-stick, and turn it over on the inside of the pasteboards on the fore edge. The corners on the inside must be cut and neatly pressed down; tie a piece of thread round the book, between the boards and head-bands, draw up the leather on the back, if necessary, to cover the top of the head-bands; rub the back very smooth with a flat folding-stick, and place it at a distance from the fire to dry.

Rough calf must be damped on the grain side with a sponge and water before pasting and covering.

Russia leather must be well soaked in water fo an hour, taken out, well beaten, and rubbed; afte which the paste must be well worked into the flesh side before covering.

Morocco must be grained by rubbing it on a board, with the grain side inside, and after being pasted, left to soak for a quarter of an hour, and the cover then drawn on with a piece of woollen cloth to preserve the grain.

Roan may be either soaked in water or left to soak when pasted.

i. Italian binding. This is a common variety of binding employed in Italy, (hence its name,) in which the books are covered with a kind of thick coarse paper. In Italy it is called "*alla rustica.*"

k. Marble binding. Named from the design of the exterior.

l. Palmer's patent binding. This consists in applying small brass bars, linked together, to the back of the book, in such a manner that they make the different sections of the book, when open, parallel with each other, and thus admit of writing, without inconvenience, on the ruled lines near the back.

m. School binding. The following is a strong method for school books:—When the books have been cut, colored, and backed, cut off the part of the bands intended to be laced to the pasteboards, and glue on the back a piece of strong smooth linen cloth, which must reach within half an inch of the head and foot, turning on the sides about an inch; paste the boards on each side of the cloth, fixing them close in at the groove, and give the books a firm pressing in the standing-press till dry. Square the boards, glue the backs, and cover and finish in the usual manner.

This method will secure and give strength to the joints, so as effectually to prevent the leather from breaking, and require no more time than lacing in the bands. The edges may now be colored, sprinkled, or marbled, as required.

n. William's patent binding. This consists in placing a back, of a curved form, turned a little at the edges, and made of iron, copper, brass, wood, ivory, or any other material of sufficient firmness. This back is adjusted to the book before it is bound, in such a manner that it may just cover, but not press upon the edges, and is fastened on by enclosing it in vellum or ferret wrappers, which are pasted down upon the boards or drawn through them. The effect is, to make the book open evenly and freely, and to prevent it from spreading on either side.

BOOTS, TO CLEAN. To do this in the best style always use "boot-trees," employ but little blacking, and brush it off while damp. The dirt should, of course, be carefully brushed off before applying the blacking.

BOOTS AND SHOES, WATERPROOF COMPOSITION FOR. *Prep.* Boiled oil 1 pint; oil of turpentine, black rosin, and bees' wax, of each 3 oz. *Proc.* Melt the wax and rosin, then stir in the oil, remove the pot from the fire, and when it has cooled a little, add the turpentine.

II. Take 3 oz. of spermaceti, and melt it in a pipkin, or other earthen vessel, over a slow fire; add thereto 6 drachms of Indian rubber, cut into slices, and these will presently dissolve. Then add *seriatim* of tallow 8 oz.; hog's lard 2 oz.; amber varnish 4 oz. Mix, and it will be fit for use immediately. *App.* The boots or other material to be treated, are to receive two or three coats, with a common bladking brush, and a fine polish is the result.

BOOT-TOP LIQUID. *Prep.* I. Oxalic acid and white vitriol of each 1 oz.; water 1½ pints. *Proc.* Dissolve and apply with a sponge to the leather previously washed with water, then wash the composition off with water, and dry. This liquid is poisonous.

II. Mix in a vial, 1 drachm of oxymuriate of potass, with 2 oz. of distilled water; and when the salt is dissolved, add 2 oz. of muriatic acid. Then shake well together, mix in another vial 3 oz. of rectified spirit of wine with ½ an oz. of the essential oil of lemon, unite the contents of the two vials, and keep the liquid, thus prepared, closely corked for use. This liquid should be applied with a clean sponge, and dried in a gentle heat; after which, the boot-tops may be polished with a proper brush, so as to appear like new leather.

III. Sour milk 1 quart; gum arabic 1 oz.; juice of 2 lemons; white of 2 eggs; oil vitriol 2 oz. Mix.

IV. Sour milk 1 quart; butter of antimony, cream of tartar, tartaric acid, and burnt alum, of each 2 oz. Mix.

BORACIC ACID. *Syn.* SEDATIVE SALT. SED. SALT OF VITRIOL. SED. SALT OF HOMBERG. *Prep.* Dissolve borax in 4 times its weight of boiling water, then add sulphuric acid to the solution until it acquires a distinct acid reaction, (about ½ the weight of the borax.) As the solution cools, crystals of boracic acid will be deposited. These crystals must be then placed on a filter, and washed with a little cold water. They may be still further purified by solution in boiling water and recrystallization.

Remarks. Even after this treatment, the crystals are apt to retain a little sulphuric acid or sulphate of soda, which can only be got rid of by heating them in a platinum crucible, before redissolving them and crystallizing the second time, as above described. When wanted perfectly pure for chemical analyses, this plan must be always adopted.

The boracic acid of commerce is extracted from the acid lagoons of Tuscany.

Prep. As thus obtained, this acid is soluble in 25 times its weight of cold, and 3 times its weight of boiling water. Very soluble in alcohol, which then burns with a bright green flame, offering a sure test of the presence of boracic acid. Odorless, and tastes bitter. Reddens litmus, but browns turmeric paper. It was once administered internally in large doses, (by Cullen,) but is now scarcely ever employed as a medicine.

BORATE. A compound, formed of the preceding acid and one of the bases.

Prop. The boracic acid has but a feeble affinity for the bases; most of the borates being decomposed by the stronger acids, the former being liberated in a free state. *Prep.* Many of them may be formed by digestion of the hydrate of the base in a solution of the acid, with the assistance of heat, or by double decomposition.

Tests. I. By digestion in slight excess of oil of vitriol, evaporating to dryness, powdering, and dissolving in alcohol, the latter will acquire the property of burning with a green flame. II. If to a strong and a hot solution of a borate, sulphuric acid be added in excess, crystals of boracic acid will form as the liquor cools.

BORATE OF MERCURY. *Prep.* I. Neutral borate of soda 265 grs.; calomel 222 grs.; grind together in a mortar, with a little water, then fill the mortar up with hot water; collect the red precipitate; wash and dry.

II. Add a solution of borax to a solution of quicksilver in nitric acid. Collect the precipitate as before. (White.)

BORATE OF SODA. I. (*Neutral borate.*) *Prep.* Saturate boracic acid in solution with carbonate of soda, at a boiling heat. (Berzelius.)

II. (*Biborate.*) This salt, often erroneously called borate and subborate, is the borax of commerce, and is a natural production. (See BORAX.)

BORAX. *Syn.* BIBORATE OF SODA. BORATE OF SODA. SUBBORATE OF SODA. REFINED BORAX. Crude borax is a natural production, and after being refined, forms a large portion of the borax of commerce. In its rough state it is called *crude borax*, *tincal*, *tincar*, &c. It is found crystallized on the edges and shallows of a brackish lake in Thibet, during the winter. It is also prepared by saturating the native boracic acid of Tuscany with soda. The market being literally overloaded with the former article, its price has fallen so low as to allow of its employment for this purpose with great advantage. A valuable paper on this subject, by M. Payen, appeared in the "Ann. de Chimie et de Phys." for July, 1841; and a translation of the same in "The Chemist," vol. ii. 368, to which the reader is referred for a complete account of this process.

The best Tuscany boracic acid contains only 50 per cent. of real boracic acid, and yields no more than 140 to 150 per cent. of good borax.

Prop., Use, &c. It is extensively employed as a flux for metals, for soldering, and in medicine. Internally it is diuretic, sedative, emmenagogue, and cooling, in doses of 15 to 40 grains; externally as a gargle for sore throat, and in powder as a detergent in aphthæ, and ulcerations of the mouth. Dissolved in rose-water, it is used as a cosmetic, and mixed with 8 times its weight of lard, forms a useful piles ointment.

Tests. These are the same as for the borates, which see. It reddens turmeric paper, and, before the blowpipe, fuses into glass, which may be tinged red by terchloride of gold, and blue by cobalt.

Pur. The purity and strength of borax are best ascertained by determining the quantity of sulphuric acid required to neutralize a given weight, as indicated by litmus paper. Common salt and alum are frequently mixed with borax to lower the value. The former may be detected by dissolving the borax in hot water, when a solution of lunar caustic will give a curdy white precipitate, soluble in ammonia; and the latter by water of ammonia, which will give a bulky white precipitate. The

former must be distinguished from the white pulverulent precipitate of borate of silver, which will be thrown down from pure borax.

BORAX, GLASS OF. *Prep.* Dry borax with a gentle heat, breaking down the froth as it rises, then melt it by increasing the heat until it runs into a glass. *Use.* In soldering, and as a blowpipe flux.

BORO-FLUORIDE OF HYDROGEN.—*Prep.* Pass fluoboric acid gas through water, and afterwards carefully concentrate the solution; cool and separate the crystalline powder from the solution, which is the boro-fluoride of hydrogen. *Prop., &c.* With most of the protoxides it interchanges bases, and metallic boro-fluorides result.

BORO-FLUORIDE OF BARIUM. *Prep.* Add carbonate of baryta to boro-fluoride of hydrogen, until it ceases to be dissolved; evaporate to the consistence of a sirup, when crystals will form. *Remarks.* The boro-fluoride of calcium, magnesium, and lead, may be formed in a similar way.

BORO-FLUORIDE OF POTASSIUM.—*Prep.* Drop boro-fluoride of hydrogen into a solution of carbonate of potassa, collect the white powder that falls, and wash it with cold water.

BORO-FLUORIDE OF SODIUM. *Prep.* Dissolve fluoride of sodium in boro-fluoride of hydrogen, and crystallize. *Remarks.* Boro-fluoride of lithium may also be formed in a similar way.

BORON. The base of boracic acid, discovered by Sir H. Davy, in 1807, by means of the galvanic battery of the Royal Institute.

Prep. Potassium, and perfectly dry boracic acid, or still better, boro-fluate of potassa, intimately mixed together, are to be placed in an adopter, or glass tube, and submitted to a low red heat. When cool, remove the loose cork that fastened its mouth, and pour in successive portions of hot water, until the whole matter is detached and dissolved. Collect the liquid and allow it to settle, then wash the precipitate, first with a solution of sal ammoniac, and finally, with alcohol; next dry the boron in a capsule, and put it into a well-stopped vial.

Prop., &c. A solid, tasteless, and inodorous powder, of grayish-brown color. With sulphur it unites at high temperatures, forming sulphurets; and when placed in chlorine gas it spontaneously inflames, and a gaseous chloride is produced. This gas may also be made by exposing calcined borax and charcoal at a red heat to the action of dry chlorine.

BOTTLE, RED. *Syn.* Taylor's Red Bottle. Whitworth Doctor's Red Bottle. *Prep.* British brandy 1 quart; powdered cochineal ½ oz.; oil of origanum 10 drops. Digest for 24 hours and filter.

BOUGIE. *Syn.* Candela. Candela cerea. Candelula. Virga cerea. Cerea. Cereola. Cereus. Cereolus. A long slender instrument, introduced into the urethra, œsophagus, or rectum, to overcome strictures of those canals. The word bougie is the French for a wax candle.

Prep. I. Add 3 parts of boiled linseed oil to 1 part of melted amber, and when mixed add 1 part of oil of turpentine; spread the mixture at 3 successive intervals upon loose spun silk cord or web, dry in a heat of 150°, and repeat the process until the instrument has acquired the proper size, then polish, first with pumice-stone, and afterwards with tripoli and oil.

Remarks. The above is the original receipt of the French professor Pickel, and is still generally used, slightly modified, on the continent.

II. Add to the oil and amber melted together, as last, caoutchouc in the proportion of $\frac{1}{20}$ of the weight of the oil employed; when dissolved, remove the vessel from the fire and proceed as before.

Remarks. This is the plan usually adopted at Paris, and for the best elastic bougies this process usually occupies from 6 to 8 weeks. When the bougie is wanted to be hollow, a piece of polished metallic wire is introduced into the axis of the silk, or tinfoil is rolled round the wire and the composition applied as before. When dry and hard the wire is withdrawn.

III. (*Caoutchouc, or elastic gum bougies.*) *a. In France* these are made by applying a solution of Indian rubber in ether, to the silk or foil prepared as above.

b. In England, where ether is expensive, naphtha is employed, or slips of Indian rubber previously boiled in water, or that have had their edges softened with ether, are wound round the wire or foil, and kept in their place by a piece of tape applied over them, as in making elastic tubes. They are afterwards carefully smoothed off.

IV. A common kind of bougie is made by dipping pieces of catgut or soft linen into lead plaster, melted, and rolling it while yet warm upon a slab. *Very inferior.*

V. (*White.*) *Prep.* Yellow wax 1 lb.; spermaceti 1 oz.; finely-powdered sugar of lead ½ oz.; melt and spread upon slips of old linen, then roll them up while warm with the spread side outwards.

VI. (*Bell's.*) Lead plaster 1 lb.; yellow wax 8 oz.; olive oil 2 oz.; *as last. Very inferior.*

BOUILLI. (French for boiled meat.) This name has been applied by cooks to several dishes of boiled meat, as a refinement on the plain English. Thus "beef bouilli, beef in bouilli, &c.," means, stewed or boiled beef, &c. As, however, the name is à la français, so must be the accompaniments, which generally consist of herbs and vegetable seasoning in greater quantity and variety than is usually deemed essential to a plain-spoken piece of boiled or stewed meat!

BOULES DE NANCY. Equal parts of iron filings and red tartar, made up into balls with spirit. *Use.* As a tonic dissolved in hot water.

BOUQUET DE LA REINE. *Prep.* I. Essence of bergamotte 1 drachm; English oil of lavender 23 drops; oil of cloves and aromatic vinegar, of each 8 drops; essence of musk 10 drops; alcohol ½ oz. Mix.

II. Oils of bergamotte and lavender 30 drops each; neroli 15 drops; oils of verbena and cloves, of each 5 drops. Essences of musk, ambergris, and jasmin, of each ½ drachm; rectified spirit of wine (strongest) 1 oz. Mix.

BOX WOOD MAHOGANY. *Prep.* Warm the wood by the fire, then wash it over with aquafortis, let it stand 24 hours to dry, and polish it with linseed oil reddened with alkanet root, or give it a coat of varnish, made by dissolving aloes and annotto in spirit of wine.

BOYLE'S FUMING LIQUOR. Hydrosulphuret of ammonia is usually employed and sold for this article, but the liquor prepared by Boyle's process contains an excess of sulphur. (Gay Lussac.) The properties of both are however the same.

Prep. Mix 4 parts of fresh slaked lime; 2 of sal ammoniac, and 1 of sulphur, then submit the mixture to distillation.

BRA GRAS. Tar, black rosin, and the dregs of strained rosin, melted together.

BRAIN CAKES. *Prep.* Clean, wash, blanch, and soak the brains, then beat them up with a little white pepper and salt, a sage-leaf or two, scalded and finely chopped, and the yelk of an egg; make them into small cakes or fritters, and fry them.

BRAN. The husk of wheat which immediately covers the grain, and which is left in the bolting machine. *Use.* It is largely employed by the calico printers, when diffused through hot water, to remove the coloring matter from those parts of their goods which are not mordanted. A handful mixed with a pail of warm water, forms an excellent emollient foot-bath. Infused in water, (*bran tea*,) and sweetened, it forms a popular demulcent, much used in coughs and hoarseness, and, taken in quantity, proves gently laxative. It also forms an excellent manure, and, from containing the ammoniaco-magnesian phosphate, is especially adapted for potatoes. It is frequently mixed with flour and made into bread, by the poorer orders.

BRANDY. *Syn.* Eau de Vie. Aqua Vitæ. Spiritus Gallicus. Brandy-wine. The spirituous liquor obtained by the distillation of wine. When first distilled it is colorless, and only acquires a yellowish tint from the wood of the casks, in which state it is known and sold as pale or white brandy. The deep color that it usually possesses, is imparted to it by adding a little spirit coloring, (burnt sugar or caramel,) and occasionally a little red sanders wood as well, and is intended to imitate the appearance acquired by brandy from great age, when kept in wood. The natural color, however, which the spirit receives from the cask, no matter how long it may have been in it, never exceeds an amber tint, about the common color of pale Jamaica rum; but the public taste has been gradually vitiated in this respect, until only a spirit of a lively and full "*brandy color*" (unless for a pale brandy) will sell.

The brandies most esteemed in England are imported from France, and are those of Cognac and Armagnac, the preference being generally given to the former. The brandies of Rochelle and Bordeaux may be reckoned next in quality, while those obtained from Portugal, Spain, and Italy are very inferior.

The constituents of brandy are alcohol and water, and small quantities of volatile oil, acetic acid, acetic ether, œnanthic ether, coloring matter, and tannin. It is from the presence of the last six of these substances that the spirit derives its distinguishing smell and flavor. The quantity of alcohol present in brandy varies from 48 to 55 per cent. When first imported, it is generally 1 or 2 overproof, but by age its strength is lessened, and by the time it is usually taken from the bond store for sale, seldom exceeds 3 or 4 underproof. From considerable personal acquaintance with the cognac trade, I feel confidence in asserting, that brandies of the best quality seldom exceed proof, and are generally below it, and that it is a common practice in France to add spirit of wine and coloring to raise the strength to any given point desired by the English purchaser, and to charge the same in the invoice; or where the purchaser is not *well acquainted with the subject*, and desires a strong spirit at a low rate, to sell him brandy so mixed as genuine. The very finest brandies average from 5 to 10 u. p., and never exceed about 2 u. p.; they then contain more than ½ their weight of water, and from their boiling point being higher, they come over more highly charged with essential oil, and other volatile and fragrant principles of the grape, and thus possess in a greater degree that peculiar aroma and flavor for which they are so much esteemed. French brandy or wine, distilled at a low temperature in a water bath, yields a very pure and scarcely flavored spirit.

The quality of the brandy imported from France varies considerably from that which is drunk on the continent, principally from its being *prepared*, or, as it is technically termed, "*made up*," for the London market, which means lowering it by the addition of spirit, coloring, &c. above described. The common strength at which foreign brandy is sold in England is about 11 or 12 u. p., and below 17 u. p. it becomes seizable by the excise. The strength at which it is sold and permitted in trade, is generally 10 u. p., to which it is reduced by adding water, and never less than 12 u. p., unless it be specially agreed upon. In large quantities and from bond, of course the strength depends much upon the age and quality of the spirit. A fine old brandy being, perhaps, 8 or 10 *u. p.*, while one of the last year's vintage of a commoner quality may be as strong as 2 or 1 *u. p.* But these distinctions are familiar to every experienced brandy dealer.

In France there are several varieties of this spirit distilled, which are known by names descriptive both of their quality and source. The "*eau de vie supérieure*," or *cognac brandy*, is generally obtained from pale white wines, by careful distillation, and is remarkable for its superior flavor. When kept in glass or stone bottles, it is called white cognac brandy, and the same term is also generally applied when it has been kept in casks, but has not been artificially colored; in the latter case, however, it generally acquires a pale amber tint.

The "*eau de vie ordinaire*," or *common brandy*, is distilled from high-colored white or red wines, and has generally a sp. gr. of 0·948, and varies from 22 to 27 u. p.

The "*eau de vie de marc*" is obtained from the lees of vinegar and other wines, the marc or cake of grapes from which the juice has been pressed, and the commonest red wines, fermented and distilled together by a quick fire, to drive over as much essential oil and flavoring as possible.

The "*eau de vie seconde*" is the weak spirit that passes over after the stronger spirit has been drawn off, and the receiver changed. *It is used* for common drinking, or mixed with other brandy.

The "*eau de vie à preuve d'Hollande*" is brandy about 19° Baume, or sp. gr. ·9420, the common strength at which it is retailed in France, and will stand the "*proof*" or "*bead*"

The "*eau de vie à preuve d'huile*" is the strongest brandy usually drunk; it is about 23° Baume, or sp. gr. ·918; pure olive oil will just sink in it; hence the above term.

The "*eau de vie fort*" is usually prepared by the redistillation of common brandy, keeping the first portion separate. It answers to our spirit of wine. It is made of 12 different strengths, distinguished by names, exhibiting the quantity of water required to reduce the sample to the "*preuve d'Hollande.*" The weakest is called cinq-six, or $\frac{5}{6}$, and the strongest trois-neuf, or $\frac{3}{9}$, the difference between the numerator and the denominator being the quantity of water the 3 parts of the former will take to reduce it to the "*preuve,*" when it would make 9 parts. Its sp. gr. is about ·839.

The *esprit de vin* is brandy or spirit rectified to 0·890 and upwards.

The general method of distilling brandy in France differs in no important particular from that practised in England, for grain or molasses spirit. Neither are the French workmen more skilful nor more cleanly in their operations than the English. It is the materials alone that, in this case, conduce to the superiority of the product. The quality of the brandy varies with that of the wine from which it has been distilled. Every soil, every climate, every kind of grape, produces a wine possessing some peculiarity confined to itself, and this wine on distillation produces a spirit possessing like distinctions. A large quantity of brandy is prepared in France soon after the vintage, as the juice of the poorer grapes that is unfit for wine is fermented and at once distilled. It is a general rule, in France, to distil only such wines as are unsaleable, as the profits on the wine, sold as such, are much greater than when it is converted into brandy.

The Strength of Brandy may be ascertained in the same way as alcohol, for which purpose Sike's hydrometer is used in England. In France, from the value of spirit being less, it is frequently tested by simpler methods, though great accuracy obtains, in this particular, where necessary.

Pur. Very little perfectly pure French brandy is obtained by the small consumer in England, as it is not only generally lowered a little by the wholesale dealer, but undergoes a like process at the hands of the retailer. The safest method is either to procure it direct from the bond store, without its even entering a private cellar, or to buy of some known respectable party, and to pay a price that will offer no inducement to dishonesty. If this be not done, by all means buy British brandy, which is now made of excellent quality by many of the leading houses, as *Betts, Bretts, Booth,* and *Grimble.* From the two former a single sealed bottle may be procured at the same price as by the gallon.

The importation of foreign brandy for home consumption amounts to about 1,400,000 gallons a year.

BRANDY, (REDUCED.) I. To 20 gallons of Cognac brandy add 5 gallons of the best British brandy.

II. To 72 gallons of full-flavored French brandy, add 10 gallons of spirit of wine, (58 *o. p.,*) 8 gallons of water, and 1 pint of good coloring. Rummage well up and let it stand until the next day. *Remarks.* The above reduction is generally adopted in trade, and is known by the name of "*improving.*" But such is the poverty of the palate of the English brandy drinker, that the adulteration is often not suspected, even when it is carried to double the extent of the above, which is generally exceeded in the hands of the retailer. So long, however, as the foreign spirit constitutes about half of the mixture, and was at first of decent quality and age, the infatuated Englishman smacks his lips, and cunningly holding up his glass between the light and his eye, exclaims, "*Ah! this is a drop of the real.*"

BRANDY, (BRITISH.) *Syn.* British Cognac. Imitation Cognac, &c. From the heavy duty levied on French brandy imported into England for home consumption, it has become a desideratum with the distiller (rectifier) to produce an English spirit of a similar description. For some time the attempt proved quite unsuccessful, but of late years much capital and talent have been embarked in the pursuit, and the result has proved very satisfactory. An article of British manufacture may now be purchased, at a very reasonable rate, of really respectable quality, and possessing much of the flavor and aroma of foreign brandy, while, as a beverage, it is equally wholesome. Much of the British brandy, however, that is commonly met with, is of such a wretched quality as to be quite undeserving of the name, which is evidence of the fact, that much skill and experience is required to ensure success in its manufacture. For a long time this liquor was distilled from spoilt wine and dregs of wine, both British and foreign, mixed with beer bottoms and similar articles; and when, instead of these, corn, malt, and molasses spirit were employed, it was considered as an unpardonable and wicked misuse of those articles. Modern experience has proved, however, that perfectly pure and tasteless malt spirit is the best article to form into an imitation brandy.

The following formulæ, by skilful management, will produce very good brandy, but it must be recollected that much depends on the quality of the materials employed, as well as on the operator. As the strength and quality of the ingredients, and the methods of manipulation vary, so will the result; much must therefore be left to the judgment and discretion of the artist. It offers a profitable pursuit to the ingenious and industrious chemist and rectifier.

Prep. I. Take 12 gallons of the finest flavorless malt spirit at proof, (or if of a different strength a proportionate quantity;) add thereto 5 gallons of water, $\frac{3}{4}$ lb. of the best crude red tartar or winestone, previously dissolved in 1 gallon of boiling water; $\frac{1}{4}$ pint of acetic ether; 2 quarts of good French wine vinegar; 7 lbs. of bruised French plums, and 1 or 2 gallons of wine bottoms or flavor stuff from Cognac, mix them in a fresh-emptied sherry cask, and let them stand together for 14 days, frequently rummaging up the liquor with a stick; next draw over 15 gallons of the mixture from a still furnished with an agitator. Put the rectified spirit into a clean, fresh-emptied Cognac brandy cask, and add thereto $\frac{3}{4}$ pint of tincture of catechu, 1 lb. of fresh and clean oak shavings, and about a pint of good spirit coloring. Bung close, and agitate occasionally for a few days. *Remarks.* Age improves the above article, and renders it

(provided the process be well managed) of a very superior quality. The above receipt yields 15 gallons of brandy 17 *u. p.* The following forms may also be recommended:—

II. Perfectly pure spirit, pf. 99 gallons; red tartar, dissolved, 7 lbs.; acetic ether 3 lbs.; wine vinegar 3 gallons; bruised raisins, or French plums, 7 lbs.; bitter almonds, bruised, 1 oz.; water sufficient. Dissolve the tartar in the water, then add the other ingredients, macerate as before, and draw over 120 gallons; lastly, add a few lbs. of oak shavings, 1 lb. of powdered catechu made into a paste with water and burnt-sugar coloring as before. *Remarks.* This yields 120 gallons of spirit fully 17 *u. p.*

III. Clean spirit 17 *u. p.*, 100 gallons; nitric ether 2 quarts; cassia buds, ground, 4 oz.; bitter almond meal 2 oz.; orris root, sliced, 6 oz.; powdered cloves 1 oz.; capsicum 1½ oz.; good vinegar 2 gallons; brandy coloring 1 quart; powdered catechu 1 lb.; full-flavored Jamaica rum 2 gallons. Mix well in an empty Cognac cask, and let them macerate for a fortnight, occasionally stirring. *Remarks.* The proportion of the ingredients may be varied by the skilful brewer, as much depends on their respective strengths.

IV. Good plain malt spirit, 17 *u. p.*, 100 gallons; finely-powdered catechu 12 oz.; tincture of vanilla 4 oz.; burnt-sugar coloring 1 quart; good rum 3 gallons, or more; acetic or nitric ether 2 quarts. Mix well.

V. Clean spirit, 17 *u. p.*, 89 gallons; high-flavored cognac 10 gallons; oil of cassia 1½ drachms; oil of bitter almonds, essential, ½ a drachm; powdered catechu 10 oz.; cream of tartar, dissolved, 16 oz.; Beaufoy's concentrated acetic acid 3 lbs.; sugar coloring 1 quart, or more; good rum 1 gallon. Put the whole into a fresh emptied brandy piece, and let them remain a week together, with occasional agitation, then let them stand to settle. If this mixture be distilled, the French brandy, rum, coloring, and catechu, should not be added till afterwards.

VI. To colored plain spirit at 17 *u. p.*, add a little tincture of catechu, and a sufficient quantity of essential oil, distilled from wine lees, to give it a proper flavor. This oil is obtained by distillation from the wine lees, either dried and made up into cakes, or in their wet state mixed with about 7 times their weight of water. It should be dissolved in alcohol, and kept in this state, as it is apt to lose its flavor. *Remarks.* When this process is well managed a very capital article results, but it requires considerable address to conduct it well. The spirit produced by this plan is better for distillation. The brandy from any part of the world may thus be imitated, by distilling the oil from the lees of the wines produced in the particular district. This is the only method of producing an exact imitation. A pound each of finely-powdered charcoal and ground rice has been recommended to be digested in a gallon of spirit for a fortnight. Where black tea is cheap, as in America, it is very commonly employed to impart the roughness and flavor of brandy to colored spirits.

BRANDY, CHERRY. *Prep.* I. To every gallon of brandy put an equal measure of cherries, bruised between the fingers; steep for 3 days, then express the liquor; add 2 lbs. of lump sugar, and strain for use.

II. To the above add 1 quart of raspberries, and ½ a pint of orange-flower water. *** Quality very fine.

III. Treacle 1 cwt.; spirit (45 u.p.) 41 gallons; bruised bitter almonds (more or less, to taste) 5 oz.; cloves 1 oz.; cassia 2 oz. Put the ingredients into a large cask, well mix and let them lie a month, occasionally stirring.

Remarks. Equal parts of fully ripe Morello and black cherries produce the richest cordial.

BRANDY, CARAWAY. *Prep.* I. Steep 4 oz. of bruised caraway seeds and 2 lbs. of sugar in 1 gallon of British brandy, for a fortnight.

II. Sugar 1 lb.; caraways 1 oz.; 3 bitter almonds; spirits of wine and water, of each 1 quart; (or spirit 22 u.p. ½ a gallon.) Macerate as above.

BRANDY, DANTZIC. This is distilled from rye, ground with the root of calamus aromaticus. It has a mixed flavor of orrice and cinnamon.

BRANDY, LEMON. *Prep.* I. Steep ½ lb. of fresh lemon peel and ½ a dozen lemons, cut in slices, in 1 gallon of brandy, for a week, then add 1 lb. of lump sugar.

II. Proof spirit 7 gallons; essence of lemon 3 drachms; sugar 5 lbs.; tartaric acid 1 oz., dissolved in water 2 gallons; coloring q. s. Mix, and rummage repeatedly for 14 days. *Remarks.* Sometimes milk is added to the above, in the proportion of 1 quart (boiling hot) to every gallon.

BRANDY, MALT. Malt spirit, flavored with sweet spirits of nitre and terra Japonica, and colored with treacle, or spirit coloring. (See BRIT BRANDY.)

BRANDY, ORANGE. This may be made in a similar way to lemon brandy.

BRANDY, PEACH. *Prep.* I. From peaches, by fermentation and distillation. Much used in the United States, where peaches are very cheap.

II. Bruise the peaches, then steep them in twice their weight of British brandy, or malt spirit; lastly, express the liquor.

III. Bitter almonds (bruised) 2 oz.; proof spirit (light) 10 gallons; water 3 gallons; sugar 5 or 6 lbs.; orange-flower water ½ a pint. Mix, and macerate for 14 days.

*** Color with brandy coloring, if required darker.

BRANDY, RASPBERRY. *Prep.* I. Pour as much brandy over raspberries as will just cover them; let it stand for 24 hours, then drain it off, and replace it with a like quantity of fresh spirit; after 24 hours more, drain this off and replace it with water; lastly, drain well, and press the raspberries quite dry. Next add sugar to the mixed liquors, in the proportion of 2 lbs. to every gallon, along with a ¼ of a pint of orange-flower water.

II. Mix equal parts of mashed raspberries and brandy together, let them stand for 24 hours, then press out the liquor. Sweeten as above, and add a little cinnamon and cloves, if agreeable; lastly, strain.

BRASS. An alloy of copper and zinc.

Hist. and Prep. Brass was formerly manufactured by cementing granulated copper, or copper clippings, with calcined calamine and charcoal, in crucibles, exposed to a bright heat. The alloy

was found in lumps at the bottom of the crucible on cooling. These were remelted and cast into ingots. At the present day, brass is generally made by direct union of the metals. This process requires much care, owing to the different degrees of fusibility of copper and zinc. The proper quantity of zinc is first melted, and slips of copper plunged into it, which are rapidly dissolved, as it were, and the addition is continued until an alloy is formed, somewhat difficult of fusion, when the remainder of the copper is added. The brass thus formed is broken into pieces, and remelted under charcoal, and a proper addition of either zinc or copper made, to bring it up to the color and quality desired. It is next cast into plates, or other forms, in moulds of granite. When submitted to the rolling-press for reduction to *thin* plates, it requires to undergo the operation of annealing several times.

Prep. I. (*Fine Brass.*) 2 parts of copper to 1 part of zinc. *Remarks.* This is nearly 1 equivalent each of copper and zinc, if the equivalent of the former metal be taken at 63·2; or 2 equivalents of copper to 1 equivalent of zinc, if it be taken, with Liebig and Berzelius, at 31·6.

II. Copper 4 parts, zinc 1 part. An excellent and very useful brass.

III. (*Gold-colored Brass.*) *Syn.* Red Brass. Dutch Gold. Tombac. Similor. Prince's Metal. Pinchbeck, &c.

a. Copper and zinc, equal parts.

b. Copper 2 parts; zinc 1 or 1½ parts. This is Manheim gold.

c. Copper 3 to 5½ parts; zinc 1 part. Deep colored.

Remarks. The proportion of zinc in this alloy is altered to suit the color and other properties to the purposes for which it is intended, and often varies from ⅓ to ⅕, or ⅙ of the weight of the alloy. At the celebrated works of Hegermühl, near Potsdam, the proportions are 11 parts of copper to *two* of zinc, which produces a metal which is afterwards rolled into sheets for the purpose of making Dutch leaf-gold.

BRASS, BUTTON. (*Best.*) I. Copper 8 parts; zinc 5 parts, as above.

II. (*Common.*) Copper 50 parts; zinc 40 parts; tin 4 parts; lead 6 parts.

BRASS, FOR SOLDER. *Syn.* Hard Solder. I. 12 parts of brass; 6 parts of zinc, and 1 of tin, melted together.

II. 2 parts of brass, and 1 of zinc.

III. (*Very strong.*) 3 parts of brass, and 1 of zinc.

BRASS, TURNER'S. 98 parts of brass, and 2 of lead. *Remarks.* The addition of lead improves the brass for the uses of the turner, but lessens its malleability.

BRASS, CLEANING OF. Brass and copper are best cleaned with sweet oil and tripoli, powdered bath-brick, rotten-stone, or red brick-dust, rubbed on with flannel and polished with leather. A strong solution of oxalic acid in water gives brass a fine color. Vitriol and spirits of salts make brass and copper very bright, but they very soon tarnish, and consequently require more frequent cleaning. A strong lye of roche-alum and water will also improve brass.

Brass inlaid work may be cleaned as follows:—Mix tripoli and linseed oil, and dip into it a rubber of hat, with which polish the work. If the wood be ebony or rosewood, polish it with a little finely-powdered elder-ashes; or make a paste of rotten-stone, a little starch, sweet-oil, and oxalic acid, mixed with water. The ornaments of a French clock are, however, best cleaned with bread-crumb, carefully rubbed, so as not to spoil the woodwork. Ormolu candlesticks, lamps, and branches, may be cleaned with soap and water. They will bear more cleaning than lacquered articles, which are spoiled by frequent rubbing, or by acids, or strong alkalis.

BRASS COATING. I. Brass plates and rods may be covered with a superficial coating of brass, by exposing them in a heated state to the fumes of melted zinc, at a high temperature. *Use.* For rolling into thin plates, or drawing into wire. The celebrated spurious gold wire of Lyons is thus made.

II. Vessels of copper may be coated with brass, internally, by filling them with water strongly acidulated with muriatic acid, adding some amalgam of zinc and cream of tartar, and then boiling for a short time.

BRASS-COLORED PIGMENT. *Syn.* Brass Bronze. *Prep.* I. (*Red.*) Grind copper filings, or precipitated powder of copper, with a little red ochre.

II. (*Yellow or gold-colored.*) Gold-colored brass, or Dutch leaf reduced to a very fine powder.

Remarks. Both these powders are mixed up with varnish, and used as a paint. No more should be mixed at a time than wanted for immediate use. They are also used by dusting them over any surface, previously covered with varnish to make them adhere. (See Oxide of Copper.)

BRASS-COLORED VARNISH. *Prep.* Dissolve 1 oz. each of pale shell lac and gum sandarach, in ½ a pint of rectified spirit of wine.

Use. To mix up the preceding powders.

BRASS, PASTE FOR CLEANING. *Prep.* I. Soft soap 2 oz., rotten-stone 4 oz.; beat them to a paste.

II. Rotten-stone made into a paste with sweet oil.

III. Rotten-stone 4 oz.; oxalic acid 1 oz.; sweet oil 1½ oz.; turpentine enough to make a paste.

Use. To clean brass. The first and last are best applied with a little water. The second, with a little spirits of turpentine, or sweet oil. Both require friction with soft leather.

BRASS ORNAMENTS, PRESERVATION OF. Brass ornaments, when not gilt or lacquered, may be cleansed, and a fine color given to them by two simple processes. The first is to beat sal ammoniac into a fine powder, then to moisten it with soft water, rubbing it on the ornaments, which must be afterwards rubbed dry with bran and whiting. The second is to wash the brass-work with roche alum boiled to a strong lye, in the proportion of an ounce to a pint; when dry, it must be rubbed with fine tripoli. Either of these processes will give to brass the brilliancy of gold.

BRASS STAIN. I. Cut sheet-brass into small pieces, and expose it to a strong heat for 2 or 3 days, then powder it, and again expose it for several days to a like heat; again powder and sift,

and expose it a third time to heat, testing it occasionally, to see if it be properly burnt. When this is the case, a little of it fused with glass will make the latter swell and froth up.

Uses, &c It imparts to glass a green tint, passing into torquoise.

II. Calcine equal parts of plate-brass and sulphur, stratified together in a crucible, until they become friable; then powder and expose them again, as last.

Use. Imparts a calcedony red or yellow tinge to glass by fusion, according to the mode of using it.

BRAWN, CHOICE. When young, the horny parts feel moderately tender; if the rind be hard, it is old.

BRAWN, MOCK. *Prep.* Take the head and belly piece of a young porker, well saltpetred; split the head and boil it; take out the bones and cut it to pieces; then take four ox-feet boiled tender, and cut them in thin pieces; lay them in the belly piece, with the head cut small; roll it up tight with sheet tin, and boil it four or five hours. When it comes out, set it up on one end, put a trencher on it within the tin, press it down with a large weight, and let it stand all night. The next morning take it out of the tin, and bind it with a fillet, put it into cold salt and water, and it will be fit for use; it will keep a long time, if fresh salt and water are put into it every four days.

BRAZIL WOOD. *Syn.* Sapan Wood. Saint Martha Wood. Fernambuca. This wood is much used in dyeing. A decoction is made by boiling for some hours in hard spring water, and this is generally kept for some time, or until it undergoes a species of fermentation, as it is thus found to yield more permanent and beautiful colors than when employed quite new. *Use.* To dye *red.*

BRAZIL WOOD DYE. I. (*For cotton and linen.*) *a.* First boil the goods in a bath of sumach, next work them through a weak mordant of solution of tin, and then run them through the Brazil bath, lukewarm. This gives a bright red.

b. First alum the goods and rinse them, then give them a mordant of solution of tin, rinse again, and turn them through the dye-bath. This gives a rose color.

Remarks. The shades of this dye may be varied by the strength of the bath, mordant, &c. A little alum added to the Brazil-bath, gives a purple tint. 1 lb. of Brazil wood, ½ oz. of alum, and 2 oz. of tartar will dye 20 to 25 lbs. of cotton.

II. (*For silk.*) The silk, after being well alumed in the same way as wool, but at a lower temperature, is rinsed, and passed through the decoction of Brazil, just lukewarm.

Remarks. By adding a little alkali to the bath, or by passing the silk through a water holding a little alkali in solution, after it is dyed, will produce what is called the false crimson. When wanted of a very deep crimson, a little logwood is added to the Brazil-bath. In this way any shade of color may be produced.

III. (*For wool.*) Boil the wool in water holding in solution 5 parts of alum and 1 of tartar, for 1 hour; then let it lie in the cold liquor for several days, frequently moving it about; lastly, boil it in a decoction of Brazil for ½ an hour.

BRAZILINE. *Syn.* Brezilinе. The coloring principle of Brazil wood, obtained by Chevreul in small orange-colored needles. It is soluble in both water and alcohol; alkalis turn it violet, acids yellow. With alum it dyes red.

BRAZING. The operation of uniting the edges of pieces of copper, brass, iron, &c., by means of hard solder.

Proc. The edges, after being filed quite clean, are covered with a mixture of hard solder and powdered borax, made into a paste with water. The whole is then allowed to dry, and afterwards exposed in a clear fire to a heat sufficient to melt the solder.

Remarks. In some cases a little silver is added to the solder, when it receives the name of "*silver solder.*"

BREAD. *Principles of bread-making, &c.* This most important article of food is made of the flour of different grains, but only those that contain gluten admit of conversion into light spongy bread. Hence it is that wheat flour is best calculated for this purpose. When flour is made into a stiff paste or dough with water, and rolled into cakes and baked, it forms biscuits, or unleavened bread, which was once the only description known. When the dough, previously to baking, is left for some time in a moderately warm place, varying from 80° to 120°, a state of fermentation comes on, formerly called the panary fermentation, but which is, in reality, the sugar of the flour gradually undergoing the process of conversion into alcohol, and resembles in every respect the same change which takes place in the manufacture of wine, beer, &c. During this process, a large quantity of carbonic acid gas is liberated, and the toughness of the dough preventing its escape, the whole mass becomes puffed up and spongy, and a light porous paste is formed, ready for baking into bread. The natural process of fermenting the dough just described, is, however, subject to much uncertainty, and is inconvenient from the time it occupies to complete it, and the tendency the dough has to run into the acetous fermentation, when it acquires a sour and disagreeable taste, and is rendered less nutritious and easy of digestion. This has led to the use of a *ferment*, which at once excites a proper state of fermentation throughout the mass, and speedily renders it light and spongy. *Leaven* or *dough*, already in a state of fermentation, was originally employed for this purpose, and the bread so made was hence called *leavened bread.* But this has been wholly superseded by barm or yeast. Thus it will be seen that all that is essential to make a loaf of bread, is to add a proper quantity of yeast to the dough, and to allow it to remain for a short time in a warm place, until it rises or becomes spongy, when it must be subjected to the operation of baking. If the process be well managed, and the flour be good, bread of superior quality will be produced.

Process of making bread. In preparing his dough, the modern baker takes a part of the water needed for the batch, and having warmed it to a temperature of about 80° or 90°, dissolves his salt therein, and then adds the yeast and a portion of the flour. These he works up into a dough, which he sets aside in a warm place usually provided for

the purpose, and called the "*kneading trough*," where it soon begins to ferment and swell up. This process is called "*setting the sponge*," and according to the proportion the water in it bears to the whole quantity that is to be used, it receives the name of "*whole*," "*half*," or "*quarter sponge*." The evolution of carbonic acid in the process of fermentation, causes the sponge to heave and swell, and when the surface bursts, it subsides, and then swells again and again in a similar manner. This action would go on for some time, if not interfered with; but the baker is careful to stop it before it has communicated a sourness to the mass. After the *first*, or at the *furthest*, after the second or *third* "*dropping of the sponge*," he adds the remaining quantity of flour, water, and salt, necessary to form the batch. These he incorporates by long and laborious kneadings, until the entire mass acquires uniformity, and is sufficiently tough and elastic to bear the pressure of the hand without adhering to it. The dough is now left to itself for a few hours, during which time fermentation goes on, after which the inflated mass is again kneaded, when it is ready to be cut into pieces and weighed. These pieces are then shaped into loaves, and set aside for an hour or two, during which time they swell up to nearly double their former size; they are then placed in the oven and baked. During this operation they continue for a time to increase in size, in consequence of the dilation of the pent-up gas by the heat of the oven, until at length the fermentation is checked, and the dough becomes too solid to admit of further alteration.

Remarks. A number of other processes are used by cooks and confectioners to make the different varieties of fancy bread, cakes, puddings, &c., most of which vary according to the peculiar characteristic it is desired to communicate to them. Thus some kinds of cakes and pastes are made to eat "*short*," as it is called, or are rendered less tenacious, and a species of brittleness imparted to them by the addition of starch and sugar. In pastry a similar effect and peculiar lightness is produced by butter or lard, while in some articles, white of egg, gum-water, isinglass, and other adhesive substances are added to produce an exceedingly light and porous mass.

The different varieties of bread made in England vary chiefly in their quality, according to the flour of which they are formed. *The best white bread* is made from the purest wheat flour; *ordinary wheaten bread*, of flour to which a little of the finest bran has been added; *seconds*, from flour containing a still larger portion of bran; and common household bread, from flour produced by grinding the whole substance of the grain without any separation of the bran. Symnel bread, manchet or roll bread, and French bread are varieties made of the purest flour, from the finest wheat, a little milk being usually added for rolls, and butter and eggs for choicer purposes. Several other minor kinds of bread are also made, varied by the addition of sundry trifles, as sugar, currants, and other palatable ingredients. The Scotch "short bread" is made from a *very thick dough*, to which butter, sugar, orange-peel, and spices, are added. (See GINGERBREAD.)

In France a number of different kinds of bread are made. The "*pain bis*" is the coarsest sort, and is made of a mixture of groats and wheat flour; the "*pain bis blanc*" is made of a mixture of oatmeal and wheat flour; the "*pain blanc*" of flour from which the finest portion has been sifted; the "*pain mollet*," or soft bread, is made of the purest wheat flour, from the finest grain; the "*pain chaland*," made from the same materials as the last, but the paste is pounded; the "*pain chapalé*" is a small variety of bread, similar to the French or roll bread of England; the "*pain cornu*" is a kind of small bread, named from being done up into four-cornered pieces; the "*pain de la reine*" is another variety of small bread, and the "*pain gruau*" is a bread which has been made of late years in Paris, prepared from the small granular particles separated from the best wheat after a slight grinding. The French have also their soup bread and their country white bread, besides several other varieties, not mentioned in the above list.

In the manufacture of white bread from damaged or inferior flour, a large quantity of alum is employed by the bakers, but with the best flour no alum is required. The utmost beauty, sponginess, and sweetness, may be given to bread without the addition of one particle of alum, provided the best materials are employed. As such is not, however, generally the case, it is a common practice with the bakers to introduce 4 or 5 oz. of alum to every sack of flour, or about 1 oz. to each bushel. The method of detecting this adulteration will be presently explained. The proper quantity of salt to be used is 6 or 7 lbs. to the sack, or 1¼ lbs. to the bushel. 1 sack of the best flour, and 6 lbs. of salt, ought to yield about 360 lbs. of *good bread*, and a sack of seconds 345 to 350 lbs. of bread.

Wheaten bread, made of pure materials, is one of the most wholesome articles of food, and has been justly termed the staff of life. When well fermented and baked, it is very easy of digestion. It should never be eaten till it has stood 24 hours after being taken out of the oven, as newer bread is apt to disagree with the stomach, frequently producing flatulence, heartburn, and indigestion.

Adult. This is often carried to a fearful extent: Mr. Accum says, "The bakers' flour is very often made of the worst kinds of damaged foreign wheat, and other cereal grains mixed with them in grinding the wheat into flour. In this capital, no fewer than six distinct kinds of wheaten flour are brought into the market. They are called fine flour, seconds, middlings, fine middlings, coarse middlings, and twenty-penny flour. Common garden beans and peas are also frequently ground up among the London bread flour.

"The smallest quantity of alum that can be employed with effect to produce a white, light, and porous bread, from an inferior kind of flour, I have my own baker's authority to state, is from 3 to 4 oz. to a sack of flour weighing 240 lbs."

"The following account of making a sack of five bushels of flour into bread, is taken from Dr. P. Markham's 'Considerations on the Ingredients used in the Adulteration of Flour and Bread,' (p. 21:) 5 bushels of flour; 8 oz. of alum; 4 lbs. of salt; ½ gallon of yeast, mixed with about 3 gallons of water.

"Another substance employed by fraudulent

weight of good fat may be obtained, fit for culinary purposes when fresh, but always excellent for making soap and candles. (Proust.)

BONE GLUE. *Syn.* GELATINE. *Prep.* This is made by dissolving out the earth of bones, previously boiled for the grease, washing the remaining jelly with water, then boiling it with a little water, and forming it into cakes for sale. (SEE GLUE.)

BONE MANURE. For this purpose the bones are ground to a coarse powder in a mill, and sowed along with the seed in a drill. It is said that wheat thus treated yields 30 to 50 per cent. more in weight of straw and grain than by the common methods. It is usually applied to light or turnip soils, which it renders more than ordinarily productive. Bone manure is much used in the west of Yorkshire, Holderness, and Lincolnshire. The usual quantity per acre is 70 bushels, when used alone; but when mixed with ashes, as common manure of any sort, 30 bushels per acre is thought quite enough. It is applied at the same periods as other manure, and has been found in this way to remain 7 years in the ground. The rough part of this manure, after being 5 years in the ground, has been gathered off one field and thrown upon another of a different soil, and has proved, even then, good manure.

BONES, (IN COOKERY.) The bones of good meat form most excellent materials for making soups and gravies, as is well known to every good cook. In France, soup is extensively made by dissolving bruised bones in a steam heat of 2 or 3 days' continuance, and also by dissolving out the earthy part by digestion in weak muriatic acid, when a lump of gelatine is obtained, which after being well washed with water will dissolve by boiling, and is equal to isinglass for all the purposes of making soups and jellies. Proust has recommended the following process for making the best of bones, in hospitals, jails, and similar establishments:—Crush the bones small, then boil them for 15 minutes in a kettle of water, cool, and skim the fat off, which varies from $\frac{1}{8}$ to $\frac{1}{4}$ (?) of the weight of the bones employed, and when fresh is fit for all common purposes. The bones are then ground, and boiled in 8 to 10 times their weight of water, of which that already used must form a part, until $\frac{1}{2}$ is wasted, when a very nutritious jelly is obtained. A copper vessel should not be used, as the jelly acts upon this metal. An iron Papin's digester is the most suitable. The bones of boiled meat are nearly as productive as those of fresh meat, but roasted meat bones scarcely afford any jelly. (Dr. Young.) As boning meat before cooking is now a very general practice, a quantity of fresh bones may always be had.

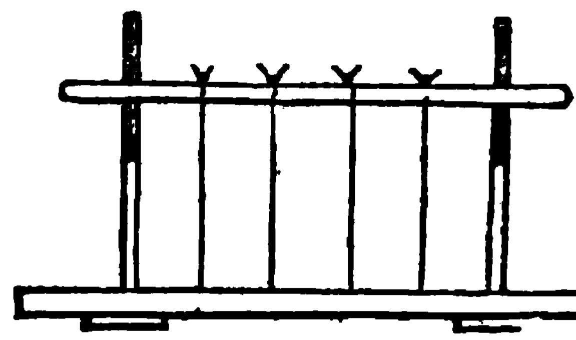
BONE SHAVINGS. *Syn.* BONE DUST. BONE TURNINGS. These yield a beautiful jelly by boiling with water, nearly equal to that produced from hartshorn shavings, for which they are very frequently sold.

BOOKBINDING. The process of binding books may be divided into several distinct operations, which, in large establishments, are usually performed by different persons, such a method being found to produce greater expedition and better work, than when the whole is done by one person. The sheets received from the hands of the printer are—

1. *Folded*, which is done correctly by observing the marks or catchwords at the bottom of the pages. As the sheets are folded they are laid upon each other in proper order, and are ready to undergo—

2. *The operation of beating*. This is performed by laying them upon a large stone, and striking them with a heavy smoothed-faced hammer, or by passing them through a rolling press. The former method is usually adopted in the small way, and the latter on the large scale.

3. *The sheets are next fastened to bands*, which is done by taking the folded sheets up one by one, and sewing them to pieces of cord, stretched in a little frame screwed or fastened to the counter or table, called the sewing-press. (See eng.) This



number of bands used, is generally 6 for a folio, 5 for a quarto, and so on proportionally, less than 4 seldom being employed even for small sizes. The ends of the cords being cut off to within about 2 inches of the back, the sheets are ready for—

4. *Glueing*. The back being knocked into shape with a hammer, and the sheets placed in the cutting press, which is then slightly screwed up, melted glue is thinly and evenly applied. After a short time the book is removed from the press, and the back properly adjusted with a hammer, when it is again put into the cutting press, where it is screwed up very tight, and is then ready for—

5. *Cutting*. The instrument employed for this purpose is of a peculiar shape, and called a plough or plough-knife.

6. *Affixing the boards*. *The bands* are now scraped out fine at the ends, and the pasteboard to form the covers is fastened thereto, and is then properly adjusted, and shaped with a large pair of shears. The edges now undergo the operation of—

7. *Sprinkling*, or other adornment. The first is performed by a stiff brush of hog's bristles, dipped in the color; the brush being held in the one hand, and the hairs moved with the other.

8. *The external covering of leather, fancy cloth, or paper*, is now applied, having been previously well soaked in paste, to make it properly adhere. One or more of the blank leaves of the book are next pasted against the inside of the cover, to screen the ends that are turned over, when the book is finished; or for choice work, is handed to a "*finisher*" for—

9. *Lettering, gilding, &c.* Gold-leaf is applied by means of white of egg, the pattern being given by pressure with heated brass tools, having the design or letters on their surfaces. The whole is then glazed over and polished.

Remarks. The succession of some of the above operations sometimes varies with the workmen and

the nature of the binding. The above must therefore only be regarded as a short and general outline of the process. If the reader will accompany the perusal by an examination of a bound book, the whole will be rendered quite familiar.

The following varieties of binding may be noticed:

a. Boards. A book, loosely done up without cutting the edges, and covered with paper or cloth, is said to be in boards.

b. Cloth-binding. This style of binding is that in which the majority of works are now issued. It admits of great neatness and even beauty, and is very durable and cheap. *Proc.* The prepared cloth, cut by a pattern to the size suited to the volume, is passed rapidly through a rolling press, between engraved cylinders of hardened steel, which print the pattern in relief. Paste is now applied to the cloth, when it is placed over the volume, previously prepared to receive it. Books in cloth-binding are not commonly cut at the edges, unless highly finished.

c. Dutch binding. This species of binding is distinguished by the backs being of vellum.

d. French binding. This consists in pasting a piece of parchment over the back of the book, between each band, and pasting the ends upon the inside of each cover.

e. Half-binding. Books forwarded in boards, and finished with leather backs and corners, are called "*half-bound.*"

f. Hancock's patent binding. In this method the sheets are folded in double leaves, and being properly placed together and adjusted, the book is subjected to the action of a press, and a strong solution of Indian rubber is smeared over the back with the finger. The operation is repeated, as often as necessary, when fillets of cloth are cemented on with the varnish, and the book is ready to have the boards attached. Thus several of the common operations of binding are dispensed with. I willingly bear testimony to the strength and durability of this method, and the great convenience it affords in allowing the books to open perfectly flat upon a table, or to be distorted in any possible manner, without injury to their backs. It is the best way of binding books for travellers. I once had a large trunk of books, among which was one bound on Hancock's plan. All the rest were nearly torn to pieces by a few months' journey, but this one was uninjured.

g. Law binding. A strong method applied to law books.

h. Leather binding. *Proc.* Immerse the leather in water; after which wring it, and stretch it on a board; place the book with the boards extended thereon, and cut out the cover, allowing about half an inch larger than the book, to turn over the inside of the pasteboards. Pare the edges of the cover very thin all round on a marble slab, and paste it well; glue the back of the book, and spread the cover on the board.

Let the pasteboards be properly squared and even; put the book on the cover, which draw on very tight. Rub the cover smooth with a folding-stick, and turn it over on the inside of the pasteboards on the fore edge. The corners on the inside must be cut and neatly pressed down; tie a piece of thread round the book, between the boards and head-bands, draw up the leather on the back, if necessary, to cover the top of the head-bands; rub the back very smooth with a flat folding-stick, and place it at a distance from the fire to dry.

Rough calf must be damped on the grain side with a sponge and water before pasting and covering.

Russia leather must be well soaked in water fo an hour, taken out, well beaten, and rubbed; afte which the paste must be well worked into the flesh side before covering.

Morocco must be grained by rubbing it on a board, with the grain side inside, and after being pasted, left to soak for a quarter of an hour, and the cover then drawn on with a piece of woollen cloth to preserve the grain.

Roan may be either soaked in water or left to soak when pasted.

i. Italian binding. This is a common variety of binding employed in Italy, (hence its name,) in which the books are covered with a kind of thick coarse paper. In Italy it is called "*alla rustica.*"

k. Marble binding. Named from the design of the exterior.

l. Palmer's patent binding. This consists in applying small brass bars, linked together, to the back of the book, in such a manner that they make the different sections of the book, when open, parallel with each other, and thus admit of writing, without inconvenience, on the ruled lines near the back.

m. School binding. The following is a strong method for school books:—When the books have been cut, colored, and backed, cut off the part of the bands intended to be laced to the pasteboards, and glue on the back a piece of strong smooth linen cloth, which must reach within half an inch of the head and foot, turning on the sides about an inch; paste the boards on each side of the cloth, fixing them close in at the groove, and give the books a firm pressing in the standing-press till dry. Square the boards, glue the backs, and cover and finish in the usual manner.

This method will secure and give strength to the joints, so as effectually to prevent the leather from breaking, and require no more time than lacing in the bands. The edges may now be colored, sprinkled, or marbled, as required.

n. William's patent binding. This consists in placing a back, of a curved form, turned a little at the edges, and made of iron, copper, brass, wood, ivory, or any other material of sufficient firmness. This back is adjusted to the book before it is bound, in such a manner that it may just cover, but not press upon the edges, and is fastened on by enclosing it in vellum or ferret wrappers, which are pasted down upon the boards or drawn through them. The effect is, to make the book open evenly and freely, and to prevent it from spreading on either side.

BOOTS, TO CLEAN. To do this in the best style always use "boot-trees," employ but little blacking, and brush it off while damp. The dirt should, of course, be carefully brushed off before applying the blacking.

BOOTS AND SHOES, WATERPROOF COMPOSITION FOR. *Prep.* Boiled oil 1 pint; oil of turpentine, black rosin, and bees' wax, of each 3 oz. *Proc.* Melt the wax and rosin, then stir in the oil, remove the pot from the fire, and when it has cooled a little, add the turpentine.

Remarks. The first two articles are applied to the leather by the tip of the finger or a sponge, and allowed to dry out of the dust, and are only adapted for clean, dry weather, or indoors. The last is laid on and polished with a brush, and then left for a few hours to harden. It may also be used to revive the faded black leather seats and backs of old chairs. All of these possess great brilliancy for a time.

BLACKING, (FOR HARNESS, &c.) *Prep.* Melt 2 oz. of mutton suet with 6 oz. of bees'-wax; add 6 oz. of sugar-candy, 2 oz. of soft soap dissolved in water, and 1 oz. of indigo finely powdered; when melted and well mixed, add a gill of turpentine. Lay it on the harness with a sponge, and polish off with a brush.

BLACKING, (FOR BOOTS AND SHOES.)

I. (*Liquid.*) *Prep. a.* Ivory-black, in fine powder, 1 lb.; treacle ¾ lb.; sweet oil 2 oz.; beer and vinegar, of each, 1 pint. *Proc.* Rub together the first three until the oil be perfectly "*killed,*" then add the beer and vinegar.

b. Ivory-black and treacle, of each 1 lb.; sweet oil and oil of vitriol, of each ¼ lb. *Proc.* Mix the first three as before, then gradually add the vitriol, diluted with thrice its weight of water; mix well, and let it stand for 3 hours, when it may be reduced to a proper consistence with water or sour beer.

c. Ivory-black and treacle, of each ½ lb; oil of vitriol 1 oz.; sweet oil 2 oz.; sour beer 1 pint; as above.

d. Ivory-black 7 lbs.; treacle 6 lbs.; sweet oil 1 lb.; oil of vitriol ½ lb.; water q. s., as last.

e. Ivory-black 3 cwt.; crude molasses 2 cwt.; linseed oil 3 gallons; oil of vitriol 20 lbs.; water q. s., as last.

II. (*Paste.*) *Prep. a.* Treacle 1 lb.; ivory-black 1½ lbs.; sweet oil 2 oz.; rub together as before, then add a little lemon juice or strong vinegar.

b. Ivory-black 2 lbs.; treacle 1 lb.; olive oil and oil of vitriol, of each ¼ lb.; water q. s., as before.

c. Ivory-black 28 lbs.; treacle 21 lbs.; common oil 1 quart; oil of vitriol 3 lbs.; water q. s.

d. Ivory-black 3 cwt.; common treacle 2 cwt.; linseed oil and vinegar bottoms, of each 3 gallons; oil of vitriol ½ cwt.; water q. s.

Remarks. The manipulations required for paste and liquid blacking are the same, the difference in the two being the quantity of liquid added. Thus, by diluting paste blacking with water or beer bottoms, it may be converted into liquid blacking of a similar quality, and, by using less fluid matter, the ingredients of liquid blacking will produce paste blacking. One thing must, however, be observed, and that is, that the ivory-black used for liquid blacking must be reduced to a much finer powder than for paste blacking, as, if this be not attended to, it will settle to the bottom, and be with difficulty diffused again through the liquid. For those persons who do not like the use of blacking containing oil of vitriol, the first of the above forms, either for paste or liquid, may be adopted. The vitriol, however, greatly contributes to promote the shining properties of the blacking, and in small quantities is not so injurious to the leather as has been falsely represented, as it wholly unites itself to the lime of the phosphate contained in the ivory-black, and is thus partly neutralized. This is the reason why *lamp-black* should *never* be employed for blacking, as it has no earthy base to absorb or neutralize the acid, which would then prove very hurtful to the leather. Oil of vitriol is now employed in the manufacture of all the most celebrated shining blackings. The addition of white of eggs, isinglass, gum arabic, and similar articles to blacking, always proves injurious, as they tend to stiffen the leather and to make it crack.

BLACK, JAPAN. *Syn.* BITUMINOUS VARNISH. *Prep.* Fuse by a gentle heat 12 oz. of amber, and 2 oz. of asphaltum, then add 2 oz. of black rosin, and ½ a pint of boiled oil; mix well, remove it from the fire, and when nearly cold, add ¾ pint of spirit of turpentine; mix well together. *Use.* To varnish metals.

BLACK, IVORY. *Syn.* COLOGNE BLACK. CASSEL BLACK. *Prep.* Put into a crucible, surrounded by burning coals, fragments or turnings of ivory, or of the osseous parts of animals, and cover it closely. The ivory or bones, by exposure to the heat, will be reduced to charcoal. When no more smoke is seen to pass through the joining of the cover, leave the crucible over the fire for half an hour longer, or until it has completely cooled. There will then be found in it a hard carbonaceous matter, which must be pounded and ground on porphyry with water, washed on a filter with warm water, and dried. Before it is used it must be again subjected to grinding. *Remarks.* Black furnished by bones is reddish. That produced by ivory is more beautiful. It is brighter than black obtained from peach stones. When mixed in a proper dose with whitelead, it forms a beautiful pearl gray Ivory-black has a very deep and rich color. The Cologne and Cassel blacks are formed from ivory.

BLACK, LAMP. *Prep.* I. Suspend over a lamp a conical funnel of tin plate, having above it a pipe to convey from the apartment the smoke which escapes from the lamp. Large mushrooms, of a very black carbonaceous matter, and exceedingly light, will be formed at the summit of the cone. This carbon is reduced to such a state of division, as cannot be given to any other matter, by grinding it on a piece of porphyry. This black goes a great way in every kind of painting. It may be rendered less oily and drier by calcination in close vessels.

The funnel should be united to the pipe, which conveys off the smoke, by means of wire, because solder would be melted by the flame of the lamp.

II. This article was originally prepared by burning oil in lamps and collecting the soot in a funnel inverted over it, as above described. Hence the name. It is now, however, generally made on the commercial scale, by burning the oil of bones or common coal tar, previously freed from its ammonia, and receiving the smoke in a suitable chamber. In the patent process of Messrs. Martin and Grafton, the coal tar is violently agitated with lime water, until the two are well mixed, after which it is allowed to subside, and the lime water being drawn off, it is washed several times with hot water. After the whole of the water has been removed by subsidence and decantation, it is put into stills, and heat applied until the impurities have passed over, and the spirit runs clear and smooth. The receiver is then charged, and the heat raised sufficiently high to drive over the whole of the oil

and spirit, leaving only the asphaltum in the still. The tar or liquor in the receiver is then put into a long cast-iron tube, furnished with numerous large burners, underneath which is a furnace to heat the pipe to nearly the boiling point. Over each burner is a sort of funnel, which goes into a cast-iron pipe or main, and which receives the smoke in a similar way from all the burners. From this the smoke is conveyed by large pipes to a box, where the heaviest part of the black is deposited; from this it is carried by pipes to a second box, where another deposite takes place, and from this box the pipe is continued until it passes into a series of large canvass bags, arranged side-by-side, and connected together at top and bottom alternately. Fifty or eighty of these bags are employed, the last one being left open to admit of the escape of the smoke, which has thus been made to traverse a space of about 400 yards. As soon as the bags contain any considerable quantity of black, they are removed and emptied. The black deposited in the last bag is the finest and best, and it becomes progressively coarser as it approaches the furnace.

BLACKLEAD. *Syn.* PLUMBAGO. CARBURET OF IRON? *Qual. Use, &c.* The best blacklead comes from Cumberland, and is used for making pencils for artists. The coarser sorts are employed to impart a metallic lustre to other bodies, and mixed with grease to diminish friction. Blacklead is also used to cover the face of articles on which it is desired to deposite a coating of copper by the electrotype. It has been used in herpes, and some chronic skin diseases, in the form of an ointment, made with 4 times its weight of lard.

BLACK, PEACHSTONE. The stones or kernels of peaches, cherries, and other similar kinds of fruit, burned in close vessels, then ground and washed well. *Use.* It works well with oil; mixed with white lead and oil it makes old gray.

BLACK, PITCOAL. The best coal for this purpose is that which has a shining fracture. It affords, perhaps, the most useful brown the artist can place on his palette; being remarkably clear, not so warm as Vandyke-brown, and serving as a shadow for blues, reds, or yellows, when glazed over them. It seems almost certain that Titian made large use of this material. Coal, when burned to a white heat, then quenched in water, and ground down, gives an excellent blue-black.

BLACK REVIVER. *Syn.* PARIS'S ANTICARDIUM. *Prep.* I. Blue galls, bruised, 4 oz.; logwood, copperas, iron filings, and sumach, of each 1 oz.; vinegar 1 quart. *Proc.* Macerate in a close vessel, with heat, for 24 hours, then strain off the clear, add the filings and copperas, and shake it occasionally for a week. Keep it in a corked bottle.

II. Bruised blue galls 1½ lbs.; logwood ½ lb.; copperas 6 oz.; vinegar 1 quart; water 3 quarts. As above.

III. Galls 1 lb.; logwood 2 lbs.; copperas ½ lb.; boil for 2 hours in water 5 quarts, until reduced to a gallon, and strain. *Use.* To restore the color of black cloth.

BLACK, RUSSIAN. *Syn.* RUSSIAN LAMP-BLACK. Prepared by burning the chips of resinous deals, and collecting the black matter deposited by the smoke. It is a good black pigment, but apt to take fire spontaneously if left for some time moistened with oil.

BLACK, RICE. Prepared by burning rice in close vessels. The color is very poor.

BLACK, SPANISH. *Syn.* CORK BLACK. Cork burnt in close vessels, and the charcoal ground and washed with water. A good color, and works very soft.

BLACK, SOOT. The soot of coal fires, ground and sifted. Used as a common paint; mixed with Venetian red and oil, it makes a chocolate color; also used to make gray mortar.

BLACK, SUGAR. *Syn.* JAMAICA BLACK. Prepared by burning sugar in close vessels. It works free, but is deficient in body. It is a warm color for washing drawings, and equal in mellowness to Indian ink and bistre.

BLACK, VINE TWIG. *Prep.* From vine twigs, by calcination as above. With whitelead and oil it produces beautiful shades of silver gray and white.

BLACK, WHEAT. From wheat burnt in close vessels. *Remarks.* A superior black, between ivory and lamp-black; it has a full body and dries hard and quickly with oil.

BLADDERS. *Prep. &c.* These articles are prepared by cutting off the fat and loose membranes attached to them, and washing them first in a weak solution of chloride of lime, and afterwards in clear water; they are then blown out and submitted to pressure by rolling them under the arm, by which they become considerably larger; they are next blown quite tight, dried, and tied up in dozens for sale. *Use.* Employed by druggists and oil and colormen to tie over pots, bottles, and jars, and to contain pill masses, and other similar substances. *Caution.* Never buy bladders unless they are perfectly dry and tight, as, if the reverse be the case, they will neither keep nor prove sound.

BLANCHING OR WHITENING. An operation in cookery, performed by putting tongues, palates, meat, &c., into cold water, when it is gradually brought to boil, and the article taken out and plunged into cold water, where it is left until quite cold. It is intended to impart whiteness, plumpness, and softness.

BLANC, (IN COOKERY.) A compound, formed by mixing 1 lb. of grated bacon, 1 lb. of suet, ½ lb. of butter, 2 lemons, 3 or 4 carrots cut into dice, 3 or 4 onions, and a little water, and boiling them until done.

BLANCMANGE, (IN COOKERY.) Jelly, seasoned and made up into forms. *Prep.* I. Isinglass 1 oz.; sweet almonds, 12 in no.; bitter do. 6 in no.; milk 1 quart. *Proc.* Boil the isinglass and almonds grated in the milk, until of a proper consistence when cold; then strain it, and when nearly cold pour it into the moulds, previously rubbed with a little salad oil, and then wiped out again.

II. To the above add ½ lb. of lump sugar and 4 tablespoonfuls of cream; when cold, remelt it and add a tablespoonful of orange flower water, after which it may be moulded as before.

III. Use calves' feet jelly instead of isinglass.

IV. (MRS. HOFFMAN'S.) Isinglass ½ lb.; rosewater ½ pint; milk 2 quarts; milk of almonds ½ pint.

V. (*Rice.*) Ground rice 2 oz.; milk 1 pint; lump sugar 3 oz.; a little lemon peel and cinnamon; dissolve the rice in the milk by boiling; reduce it to a

proper consistence, then add the spice and sugar, boil for 1 minute, and strain, and when nearly cold mould as above. *Caution.* The powdered rice must be rubbed up with a little cold water previously to adding it to the milk, to prevent it running into lumps.

VI. (*West Indian.*) Make a jelly with arrowroot, and to every pint, when nearly cold, add a glass of sherry, a spoonful each of brandy and orange flower water, and 2 oz. of lump sugar.

VII. (*Transparent.*) Instead of milk use water, and clarify with the white of an egg.

BLANQUENINE. A name given by Dr. Mills to a new vegetable alkali, which he thought he had discovered in white cinchona bark. (Quar. Jour. Science, Ap. 1828.)

BLANQUETTE, (IN COOKERY.) A sort of white fricasee.

BLEACHING. *Syn.* BLANCHISSAGE. (*Fr.*) BLEICHEN. (*Ger.*) The operation by which the natural colors of substances are discharged, and they become white or colorless. Bleaching may be performed either by natural means, as exposure to light, air, and moisture, or by chemical agents, as chlorine, chloride of lime, sulphurous acid, &c. In many of the processes adopted for this purpose, both methods are combined. The most important application of the art of bleaching in the United Kingdom, is in the manufacture of textile fabrics. The celerity with which this is performed in the most perfect manner, and the trifling expense thereby incurred, contribute, in no small degree, towards inducing that preference universally shown to the productions of the looms of Great Britain.

COTTON, from its original whiteness, and little attraction for coloring matter, is more easily bleached than most other substances. On the old plan, it is first well washed in warm water to remove the weaver's paste or dressing, then "*bucked*" (boiled) in a weak alkaline lye, and after being well washed is spread out upon the grass, or bleaching ground, and freely exposed to the joint action of light, air, and moisture. The operation of "*bucking*" and exposure is repeated as often as necessary, when the goods are "*soured*" or immersed in water acidulated with sulphuric acid, after which they receive a thorough washing in clean water, and are dried. From the length of the exposure upon the bleaching ground, this method has been found to injure the texture of the cloth, and from the number of operations required, necessarily becomes expensive, and produces considerable delay; it has therefore very generally given place to the improved system of chemical bleaching, by means of chloride of lime. In this method, after the first operation of washing and bucking, as in the common process, the cotton is submitted to the action of weak solutions of chloride of lime, and afterwards passed through soured water, when it has only to be thoroughly washed and dried.

LINEN is bleached in a similar way to cotton, but the operation is more troublesome, from its greater affinity for coloring matter.

WOOL is first exposed to the joint action of fuller's earth and soap, in the fulling mill, to remove adherent grease and dirt, and is then well washed and dried, when it is usually found sufficiently white for the purposes of the dyer; but should the slight yellow tint it retains prove objectionable, it is run through water tinged blue with indigo, or it is exposed to the fumes of burning sulphur; the latter method gives it a harsh feel, which is best removed by a bath of soap and water, but this will reproduce its previous yellowishness.

SILK is bleached by boiling it in white soap and water, to remove the natural yellow varnish that covers it, after which it is subjected to repeated rinsings. Articles that are required to be very white, as gloves, stockings, &c., are also submitted to the action of sulphurous acid, or the fumes of burning sulphur.

STRAW is also bleached by the fumes of sulphur; hence arises the sulphurous smell emitted by new straw hats and bonnets. They may, however, be bleached in a much better manner by the use of a little oxalic acid, or chloride of lime.

OLD RAGS, for the manufacture of paper, and paper pulp, are generally bleached with chlorine.

PRINTED BOOKS, ENGRAVINGS, &c., may be whitened by first subjecting them to the action of weak chloride of lime water, next to water soured with sulphuric acid, and, lastly, to pure water, to remove any adhering acid or chlorine.

Remarks. The theoretical principles of bleaching are but little understood; it is thought to depend upon the action of oxygen, in a nascent state, on the particles of coloring matter, but this is unsupported by direct experiment. It is, however, an art eminently indebted to chemistry for its present efficiency, and is based on the practical application of facts which that science has called to light.

BLEEDING FROM THE NOSE. When this occurs under common circumstances, and without violence, it may be regarded as a natural effort to relieve the body from an excess of blood; but when it becomes habitual, or is the result of violence, remedial measures should be had recourse to. A simple means of arresting the hæmorrhage is to introduce, by means of a probe, a small piece of lint or soft cotton, previously dipped into some mild styptic, as a solution of alum, white vitriol, or creosote, or even cold water. This will generally succeed, but should it not, cold water may be snuffed up the nostrils, or a small piece of ice placed in the nose. Should the bleeding be very profuse, or persistent, medical advice should be had recourse to. I once saw a person (an innkeeper) lose his life in the course of a few days from a voluntary hæmorrhage from the nose, which it was found impossible to stop or lessen.

A plan has been lately proposed by Dr. Negrier, of Angiers, which, he says, is simple and certain. "It is preferable to the occlusion of the nostrils, as that is difficult to maintain, especially in sleep. During three years that, in numerous cases, he has tried this method, which is simply elevating the patient's arm, he has never found it to fail. After detailing several cases, he thus explains the rationale of the plan. When the person is standing with the arms at the side, the blood which escapes from the upper part of the arch of the aorta, takes two directions, viz., towards the head, and towards the arms, and that which goes to the head is almost equal in quantity to that which is received by both superior extremities. If, however, the individual who was formerly hanging his arms, raised them, the blood which was flowing horizon-

tally and without effort from the subclavian into the brachial arteries, must then ascend against the weight of the column of blood contained in the latter; and as there is nothing in the act of raising the arm to increase the force of the circulation, it follows, that part of the force formerly expended in sending the blood up the carotids, must now be subtracted, and added to that which drives it through the brachial arteries. This explanation may or may not be confirmed by experiments. The subject is worth investigation." (Archives générales de Médecine. June, 1842.)

BLENORRHŒA. An increased discharge of mucus from the urethra or vagina. *Treat.* Administer mild aperients and tonics. Cold bathing, and general habits of cleanliness, powerfully promote a cure.

BLIND, WRITING FOR THE. If an iron style or pencil, with a moderately fine point, be used to write with upon paper, and a little more pressure be employed than in using a common pen, characters will be produced which may easily be read by blind persons after a little practice, by passing their fingers over them, either on the side on which they were written, where they will appear in intaglio, or by reversing the paper, where they will appear in relief.

BLISTER, EXTEMPORANEOUS. I. A piece of lint dipped into vinegar of cantharides, and immediately after its application to the skin, covered over with a piece of strapping, to prevent evaporation, will speedily raise a blister.

II. Concentrated acetic acid, applied in the same way, will have a similar effect.

III. The following method, proposed by Dr. Darcq, is very simple and convenient: Into a flat watch-glass, pour from 8 to 10 drops of very concentrated ammonia; cover the liquid with a small piece of linen, of a rather less diameter than that of the glass, and slowly apply this little apparatus to the previously shaved skin. Keep the whole in its place by means of moderate pressure with the fingers.

As soon as a red ring, about 2 *centimetres* in breadth, is observed round the glass, it is certain that vesication is effected. Sometimes scarcely 30 seconds is necessary for obtaining this result. It remains only to remove the apparatus, to wash the part, and to tear away with a pair of nippers the epidermis, which comes off easily and in one piece.

The dressing is according to the object in view,—to the indications of the endermic method, for example. (Bull. de Thér. & Chem., No. L. 88.)

BLISTER, LIQUID. *Prep.* I. Spanish flies 2 oz.; boiling water 1 pint; spirits of wine 4 oz.; corrosive sublimate ¼ oz.; spirits of salts ½ oz. *Proc.* Digest the flies in the water, in a warm place, for 24 hours, then add the corrosive sublimate, dissolved in the spirits of wine, and lastly, the spirits of salts. It may either be strained, or used as it is.

II. Rectified spirit, and liquid ammonia, of each 2 oz.; oil of origanum 1 oz.; mix. Add finely powdered Spanish flies 1 oz.

III. Strongest blistering plaster 2 oz.; oil of turpentine 1 oz.; mix with a gentle heat.

IV. Linseed oil, resin cerate, and oil of turpentine, of each 2½ oz.; powdered flies 1 oz.; as above. *Use.* For horses and cattle.

BLISTER, PERPETUAL. A common blister, raised in the usual way, but instead of allowing the surface to heal up, after the discharge of the water, it is kept open by dressing it with savine or cantharides ointment.

BLISTERING TISSUE. Thin paper, or silk, spread over with a thin coat of alcoholic, acetic, or ethereal extract of Spanish flies.

BLOOD, BULLOCK'S. This article is employed for the clarification of wines and sirups; in the preparation of adhesive cements; coarse paint for out-door work; as a manure; as a bleaching powder; and for several other purposes. The blood of sheep, pigs, and bullocks, mixed with flour or oatmeal, and seasoning, is used as an aliment by the common people, but it is rather indigestible, and consequently cannot prove nourishing.

BLOOD, POWDERED. *Prep.* Dry the blood, by free exposure in thin layers to a current of air, at a heat under 125°, until it becomes sufficiently dry to powder. *Use.* For exportation to the colonies, where it is used in the sugar works. *Remarks.* Bullock's blood, dried at a temperature from 212° to 225°, and coarsely powdered, is much used by fraudulent dealers to adulterate musk.

BLOOD, SPITTING OF. (See Hæmoptysis.)

BLOOD, SPITTING OF. Popular Remedy for. *Prep.* Infusion of red roses 5½ oz.; sirup of poppies ½ oz.; diluted sulphuric acid 20 drops; mix. *Dose.* One or two tablespoonfuls four times a day.

BLOOM, ALMOND. *Prep.* Boil 1 oz. of ground Brazil wood in 3 pints of water, for 15 minutes, strain and add ¾ oz. of isinglass, ¼ oz. of powdered cochineal, 1 oz. of alum, and ½ oz. of borax; boil again for 3 minutes, or until the whole is dissolved, and strain through a piece of fine cloth.

BLOWPIPE. An instrument by means of which the flame of a candle or lamp is directed upon any substance placed to receive it, which is thus subjected to an intense heat.

The hottest portion of the flame produced by the action of the blowpipe, is at the tip of the outer white flame, which has also the property of rapidly burning or oxidizing any substance placed in it, which is capable of such an action; hence it has been called the "*oxidizing flame.*" The interior blue flame has also been called the "*reducing flame,*" from the property it possesses of abstracting oxygen from most substances placed in it.

App. "The substance to be submitted to the action of the blowpipe, must be placed on a piece of charcoal, or in a small spoon of platina, gold, or silver; or, according to Saussure, a plate of cyanite may sometimes be used. Charcoal from the pine is to be preferred, which should be well ignited and dried, that it may not crack. The sides, not the ends, of the fibres must be used; otherwise the substance to be fused spreads about, and a round bead will not be formed. A small hole is to be made in the charcoal, which is best done by a slip of plate iron bent longitudinally. Into this hole the substance to be examined must be put, in very small quantity; if a very intense heat is to be used, it should not exceed the size of half a peppercorn.

"Metallic spoons are used when the substance to be examined is intended to be exposed to the action of heat only, and might undergo some change by immediate contact with the charcoal. When the spoon is used, the flame of the blowpipe should be directed to that part of it which contains the substance under examination, and not be immediately applied to the substance itself. The handle of the spoon may be inserted into a piece of charcoal; and if a very intense heat is required, the bowl of the spoon may be adapted to a hole in the charcoal. Small portions may be taken up by platina forceps. Salts and volatile substances are to be heated in a glass tube closed at one end, and enlarged according to circumstances, so as to form a small matrass."

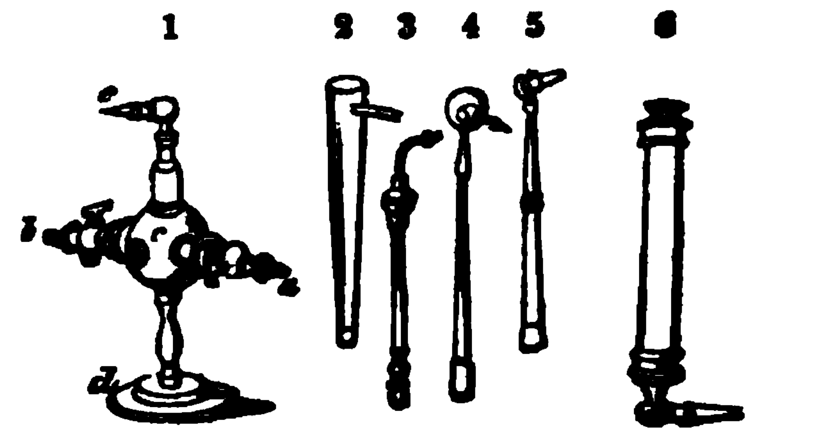
When the behavior of the substance has been observed in this way, it is melted with various fluxes, as microcosmic salt, borax, &c., and their action examined, both in the interior and exterior flame, by which means its composition may be generally ascertained, by reference to any work on mineralogy.

Beginners are usually unable to maintain a continual stream of air from the jet, which is, however, very simple to accomplish. The operation depends upon a little artifice in blowing through the pipe, which is in reality more difficult to describe than to acquire. "The effect intended to be produced is a continual stream of air for many minutes, if necessary, without ceasing. This is done by applying the tongue to the roof of the mouth, so as to interrupt the communication between the mouth and the passage of the nostrils; by which means the operator is at liberty to breathe through the nostrils, at the same time that by the muscles of the lips he forces a continual stream of air from the anterior part of the mouth through the blowpipe. When the mouth begins to be empty, it is replenished by the lungs in an instant, while the tongue is withdrawn from the roof of the mouth, and replaced again in the same manner as in pronouncing the monosyllable *tut*. In this way, the stream may be continued for a long time without any fatigue, if the flame be not urged too impetuously; and even in this case no other fatigue is felt than that of the muscles of the lips." (Ure.)

For producing extreme degrees of heat, the flame is blown with a jet of oxygen gas, and the instrument is then called an "*oxygen blowpipe;*" or a mixture of oxygen and hydrogen is burned, when it is called an "*oxy-hydrogen*" blowpipe. The heat produced by the last is so great that no substance can stand before it. The most refractory native compounds, as rock crystal, quartz, flint, chalk, plumbago, &c., are immediately fused. Gold is volatilized, and iron is rapidly consumed the instant it is placed in the flame. To use this wonderful instrument with safety, and to prevent an explosion, a peculiarly constructed jet is required. The principal blowpipes in general use are figured in the accompanying engravings. The shape of the common blowpipe adopted by the experimentalist may depend upon the fancy of its employer.

This apparatus is also furnished with valves and springs.

Beside the following there are several other va-



1, Oxy-hydrogen blowpipe.
2, Black's do.
3, Bergman's do.
4, Pepy's do.
5, Wollaston's do.
6, Hemming's safety jet for the oxy-hydrogen ditto.

a, Pipe conveying oxygen gas.
b, Do. do. hydrogen gas.
c, Ball stuffed with fine wire gauze.
e, Jet, (internal diameter 1-80th of an inch.)

rieties of blowpipes, in which the air is expelled by the pressure of a column of water, (hence called "*hydrostatic blowpipes,*") or the flame blown with the vapor of boiling alcohol, ("*spirit blowpipe.*")

Use. The blowpipe is of most extensive application in qualitative analysis, especially of minerals, and its use cannot be too highly recommended to the young chemist.

For further information on this subject the reader is referred to Gahn on the Blowpipe; to Ure's Dictionary of Chemistry; to Campbell's Translation of Kobell's Instructions for the Discrimination of Minerals; and to the Chemist, iv. 462.

BLUBBER. This substance, which is so plentiful on some parts of the coast of England, forms a very rich manure for pasture and arable land, when used at the rate of 1 ton to every 20 or 30 loads of mould, together with a chaldron of lime per acre. It must be well turned over, and after lying 3 or 4 months the land will be in prime condition.

BLUE, CHARCOAL. *Prep.* Triturate carbonized vine stalks with an equal weight of potash, then put it into a crucible and place it over the fire, until the mixture ceases to swell, keeping it well stirred all the time; next allow it to cool, dissolve it in water, and saturate the excess of alkali with dilute sulphuric acid; the liquid becomes blue, and a dark precipitate falls down, which turns of a brilliant blue color when dried and heated.

BLUE, COBALT. *Prep.* I. Dissolve Zaffre 1 lb. in ¾ lb. of nitric acid, diluted with an equal weight of water, by digestion for some hours, evaporate nearly to dryness, then dissolve in warm water, filter and add a solution of phosphate of soda as long as any precipitate falls down; collect this on a filter and wash it with cold water, then mix it while still moist with 8 times its weight of freshly precipitate hydrate of alumina, also well washed and still moist. Stir them together until dry; lastly, expose the mixture to a cherry red heat in a crucible, after which cool the mass, and reduce it to a fine powder.

II. Precipitate a solution of nitrate of cobalt as above, and proceed as before.

III. Make a strong solution of neutral nitrate

of cobalt, and mix it with pure moist alumina, then dry it and proceed as before.

IV. Precipitate a solution of nitrate of cobalt with ammonia alum, collect the precipitate, wash, dry, and heat it to a cherry red as before.

Use. A beautiful blue pigment, very permanent.

BLUE, CHEMIC. *Syn.* SAXON BLUE. LIQUID BLUE. SULPHATE OF INDIGO. *Prep.* I. Indigo 1 lb.; oil of vitriol 8 lbs. *Proc.* Put the acid into an earthenware pan, placed in a tub of water to keep it cool, and add the indigo, previously reduced to fine powder, in small successive portions, carefully stirring to prevent it *heating*. When all the indigo has been added, cover up the vessel and let it stand for 4 hours, occasionally stirring it during the time; lastly, dilute it with an equal weight of water.

II. Indigo 1 oz.; oil of vitriol 4 oz.; dissolve as before; the next day add 1 oz. of dry potash; let it stand a day longer, then dilute it with 12 oz. of water.

Use. In dyeing greens and blues, either without preparation or with a mordant of alum and tartar.

BLUE, CHINA. *Syn.* ROYAL SMALTS. *Prep.* Grind together oxide of cobalt or zaffre, with an equal weight of potash, and 8 times its weight of feldspar. Then submit the mixture to fusion in a crucible. *Use.* To paint pottery, and as a pigment.

BLUE, IRON. *Prep.* Precipitate a filtered solution of protosulphate of iron, with another of phosphate of soda. Collect the powder, wash and dry it. *Use.* A lively sky-blue.

BLUE, MOLYBDENUM. *Prep.* Dissolve sulphuret of molybdenum in nitric acid, then add some tin filings and a little muriatic acid. After digestion for some time, pour off the clear and evaporate to dryness. Mix the powder thus obtained with moist hydrate of alumina, as in making cobalt blue, and heat it to nearly a dull red.

BLUE, MOUNTAIN. Carbonate of copper, mixed with earthy matter.

BLUE, SAXON. *Prep.* Dissolve 1 oz. of sulphate of iron and 8 oz. of alum in 1 gallon of water, then add simultaneously, separate solutions of prussiate of potash and common pearlash, until they cease to produce a precipitate; lastly, allow the liquid to deposite, decant the clear portion, wash the remainder well with water, and dry it. Or a solution of the sulphate of iron may be first made and precipitated with the prussiate of potash, and instantly mixed with the solution of alum and a solution of pearlash, added until it ceases to produce a precipitate.

BLUE, SUPERB LIQUID. *Prep.* Put into a small matrass or common vial 1 oz. of pure Prussian blue reduced to powder, and pour over it from 1½ oz. to 2 oz. of concentrated mur'atic acid. The mixture produces an effervescence and the prussiate soon assumes the consistence of thin paste. Leave it in this state for 24 hours, then dilute it with 8 or 9 oz. of water, and preserve the color thus diluted in a bottle well stopped.

The intensity of this color may be lessened, if necessary, by new doses of water. If the whole of this mixture be poured into 1 quart of water, it will still exhibit a color sufficiently dark for washing prints.

BLUE, STONE. *Syn.* FIG BLUE. THUMB BLUE. KNOB BLUE. CROWN BLUE. MECKLENBURG BLUE. QUEEN'S BLUE. *Prep.* Mix finely powdered indigo with starch paste until a proper color be produced, then make it into small lumps. II. Instead of starch use whiting and a little weak size. *Use.* Employed by laundresses to give a faint blue tinge to linen.

BLUE DYE. *Proc.* First give the goods a mordant of alum, then rinse them well and boil them in a bath of logwood, to which a small quantity of blue vitriol has been added.

II. Boil in a bath of logwood, then add 1 oz. each of tartar and verdigris to every pound of logwood employed, and boil again.

III. Bilberries, elder-berries, mulberries, privet-berries, and several other vegetable blue substances, may be used to dye blue as above instead of logwood.

Remarks. By increasing the proportion of alum the color verges on purple, and by employing a little acetate of iron or green copperas, the darker shades are produced. Verdigris, blue vitriol, and alkalis turn it more on the blue, and a mordant of tin imparts a violet cast. None of these dyes, however skilfully managed, are so permanent as those produced with indigo and Prussian blue. (See INDIGO, PRUSSIAN BLUE, and DYEING.)

BOARDS, MARBLE, &c., TO TAKE OIL AND GREASE OUT OF. I. Make a paste with fuller's earth and hot water, cover the spots therewith, let it dry on, and the next day scour it off with soft or yellow soap.

II. Make a paste with soft soap, fuller's earth, and a little pearlash, and use it as above.

III. Make a paste of fresh slaked lime, water, and pearlash, and use it as above. *Remarks.* Observe not to touch the last mixture with the finger, as it is very caustic unless it be largely diluted with water.

BOERHAAVE'S RULES FOR PRESERVING HEALTH.

"Keep the feet warm;
The head cool; and
The body open."

These rules are very concise, and convey directions which, though valuable, are too often neglected.

BOILING POINT. The boiling point of water may be raised considerably above 212° Fahr. by the addition of saline matter. Thus, 60 parts of dry acetate of soda added to 40 of water raise the boiling point to 256° Fahr., and 30 parts of muriate of soda added to 70 of water raise it to 224 Fahr. As in practice, however, it proves inconvenient to employ a saturated solution for a bath, from the evaporation of the water continually inducing the salt to crystallize, it is usual to keep it considerably below that point. By means of such solutions the chemist is enabled to evaporate fluids and desiccate solids at any required temperature. The boiling point of baths containing different salts may be seen below.

TABLE of the Boiling Points of several Saline Solutions, abridged from the Table of Mr. T. GRIFFITHS. (Jour. Science, xviii. 89.)

Names of Salts.	Dry Salt in 100.	Boiling Point.
Acetate of soda, . . .	60	256° F.
Nitrate of soda, . . .	60	246
Rochelle salt, ...	90	240
Nitre, ...	74	238
Muriate of ammonia, .	50	236
Tartrate of potash, . .	68	234
Muriate of soda, . . .	30	224
Ditto, ...	20	218·75
Muriate of lime, . . .	40	216·5
Sulphate of magnesia, .	57·5	222
Supersulphate of potash,	?	222
Borax, ...	52·5	222
Phosphate of soda, . .	?	222
Carbonate of soda, . .	?	220
Muriate of baryta, . .	45	220
Alum, ...	52	220
Sulphate of potash, . .	17·5	215
Bitartrate of potash, .	9·5	214
Sulphate of soda, . .	31·5	213

Remarks. From 5 to 9 degrees are usually lost by passing through the vessel, depending on its thickness and materials. The boiling point of water in glass vessels, under common circumstances, varies from 212·54° to 215·6°, and in perfectly pure and smooth glass vessels, water may be heated to 221° F. without boiling. (M. F. Marcet.)

BOILS. *Treat.* When these appear, suppuration should be promoted by poultices of bread and linseed meal, to which a little fat or oil may be added, to prevent their getting hard. When poultices are inconvenient, exposure to the vapor of hot water, or the application of stimulating plasters, may be adopted instead. When sufficiently ripe, the matter should be evacuated, and the wound dressed with a little simple ointment spread on a piece of clean lint or linen. The diet may be full and liberal until the maturation of the tumor and the discharge of the matter, when it should be lessened, and the bowels opened by some saline purgatives, as salts or cream of tartar. When there is a disposition in the constitution to the formation of boils, the bowels should be kept regular, and tonics, as bark or steel, taken, with the frequent use of sea-bathing, if possible.

BOLAS. *Prep.* Into 2 lbs. of flour pour ¾ pint of warm milk, a small teacupful of yeast, and 6 eggs; make them into a dough, add 1 lb. of butter, by degrees, and let it rise for 1 hour, then mix in 1 lb. of powdered sugar, and make the mass into cakes; put these into cups or tins previously well buttered, and ornament the top with candied orange or lemon peel; lastly, bake them.

BOLUS OF ALUM. *Prep.* Powdered alum and conserve roses, of each 15 grs.; sirup of orange peel or saffron to mix. *Used* in fluxes, &c.

BOLUS OF MUSK. *Prep.* I. Musk 15 grs.; camphor 5 grs.; powdered gum 3 grs.; mix with sirup of saffron. *Use.* In convulsions and typhus fever.

II. Musk and carbonate of ammonia of each 10 grs.; conserve of roses q. s.; to make a bolus. *Use.* Sometimes given every three hours in mortification accompanied with spasms.

BOLUS, PURGING, (FOR DOGS.) *Prep.* Jalap and rhubarb, of each 15 grs.; ginger 4 grs.; soap 10 grs.; water q. s.; if this does not open the bowels, add aloes half a drachm, or 3 or 4 grs. of calomel. *Use.* In the distemper; it must be preceded by copious bleeding, and abstinence from food for a day or a night.

BOLUS OF SULPHATE OF ZINC. *Prep.* Sulphate of zinc 20 to 25 grs.; conserve of roses q. s. to make a bolus. *Use.* As an emetic where poison has been taken, to be followed by copious draughts of warm water or weak tea.

BOLETIC ACID. An acid discovered by Braconnot in the juice of the boletus pseudo-igniarius.

Prep. Concentrate the expressed juice to a sirup by means of a gentle heat, then digest it in strong alcohol, and dissolve the residuum in water; add a solution of nitrate of lead as long as any precipitate falls, which must be washed with water, diffused through water in a tall glass vessel, and in this state a current of sulphureted hydrogen must be passed through it, until the lead is thrown down; filter, evaporate, and crystallize; lastly, purify by resolution and crystallization from alcohol.

Remarks. This acid dissolves in 45 parts of alcohol and 180 of water, and is volatile. It is doubtful whether it be a distinct acid principle.

BOLOGNA VIAL. The bologna, or philosophical vial, is a small vessel of glass which has been suddenly cooled, open at the upper end, and rounded at the bottom. It is made so thick at the bottom that it will bear a smart blow against a hard body without breaking; but if a little pebble, or piece of flint, is let fall into it, it immediately cracks, and the bottom falls into pieces; but unless the pebble or flint is large and angular enough to scratch the surface of the glass, it will not break.

BOLOGNIAN PHOSPHORUS. *Syn.* BOLOGNIAN STONE. This is a phosphorescent stone that once excited great attention. It was accidentally discovered by a shoemaker of Bologna in the 17th century. A family of the name of Logani, who were very successful in making it, acquired a large fortune by selling it to the curious throughout Europe.

Prep. Powder native sulphate of baryta that has been previously ignited, and make it into a paste with mucilage of gum arabic; roll this into pieces a quarter of an inch thick, and dry them in a moderate heat; then expose them to the heat of a wind furnace by placing them loose among the charcoal.

Prop., Use, &c. Placed in a vial and exposed for a few minutes to the sun's rays, it will give light enough in the dark to see the figures on the dial-plate of a watch.

BOMBIC ACID. An acid which M. Chaussier extracted from the silkworm in 1781. It has since been found not to be a distinct acid.

BON-BONS. *Prep.* Provide leaden moulds, which must be of various shapes, and be oiled with oil of sweet almonds. Take a quantity of brown-sugar sirup in the proportion to their size, in that state called a *blow,* which may be known by dipping the skimmer into the sugar, shaking it, and

blowing through the holes, when parts of light may be seen; add a drop of any esteemed essence. If the *bon-bons* are preferred white, when the sugar has cooled a little, stir it round the pan till it grains, and shines on the surface; then pour it into a funnel and fill the little moulds, when it will take a proper form and harden: as soon as it is cold take it from the moulds; dry it for two or three days, and put it upon paper. If the *bon-bons* are required to be colored, add the color just as the sugar is ready to be taken off the fire.

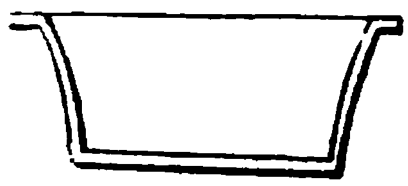
BONES. The bones of animals are employed for various purposes in the arts, manufactures, and domestic economy. (See the succeeding articles.)

BONE ASH. *Syn.* Impure Phosphate of Lime. *Prep.* Calcine bones to whiteness, and reduce the ash to fine powder. *Use.* To make pure phosphate of lime, and to form cupels. It is sold for burnt hartshorn.

BONE BLACK. *Syn.* Animal Charcoal. Ivory-Black. Bones burnt in close vessels.

Prep. On the large scale, two different processes are adopted to produce bone black.

I. (*From bones as the sole product.*) The bones broken to pieces are put into small cast-iron pots of the shape of the engraving, and varying from



⅜ to ½ an inch in thickness. Two of these being filled, are dexterously placed with their mouths together and then luted with loam. A number of vessels, thus prepared, are placed side by side and over each other, in an oven resembling a potter's kiln, to the number of 100 to 150. The fire is then kindled, and the heat kept up strongly for 10 or 12 hours, according to circumstances, until the process is completed. The whole is allowed to cool before opening the pots.

II. (*The residuum of the manufacture of Bone Spirit.*) The bones are here introduced into retorts similar to those used at the gas works, and heat being applied, the volatile products are conveyed away by iron pipes to cisterns where its condensable portion is collected. As soon as the process of distillation is finished, the solid residuum in the retorts, while still red hot, is removed through their lower ends into wrought-iron canisters, which are instantly closed by air-tight covers, and luted over. These are then raised to the ground by a crane and allowed to cool.

Remarks. Previously to distillation or calcination, the bones are boiled for their grease, which is sold to the candle and soap makers. They are then sorted, the finest pieces being selected for making handles for knives, tooth-brushes, buttons, &c.; the next sort for making into bone black; while the smallest and worst description is reserved for grinding into manure. The bones lose about ½ their weight by the process of burning. After this they are ground in a mill, sorted by sieves into two kinds, one *granular*, somewhat resembling gunpowder, and the other *quite fine.* The one is sold under the name of *animal charcoal*, for decoloring liquors, the other as a *pigment*. This article possesses the valuable property of taking lime from sirups, at the same time that it decolors them. Its power as a decolorizer may be tested by adding it to a solution of brown sugar or molasses, or water containing $\frac{1}{1000}$ part of indigo dissolved in sulphuric acid. The test should be made in a small glass tube. By well washing and careful reburning, this charcoal may be used any number of times as a decolorizer.

BONES AND IVORY, DYES FOR. 1. (*Red.*) *a.* Make an infusion of cochineal in water of ammonia, then immerse the pieces therein, having previously soaked them for a few minutes in very weak aquafortis and water.

b. Boil the bones with 1 lb. of Brazil dust, in 1 gallon of water, for 3 hours, then add ¼ lb. of alum and boil for 1 hour more.

2. (*Black.*) *a.* Immerse the pieces in a weak solution of nitrate of silver, for a short time, then expose them to the sunlight.

b. Steep for 2 or 3 days, in a decoction made with 1 lb. of galls and 2 lbs. of logwood, then steep for a few hours in iron liquor, (acetate of iron.)

3. (*Green.*) *a.* Steep in a solution of verdigris to which a little aquafortis has been added.

b. Dissolve distilled verdigris in weak vinegar, and steep the pieces therein.

c. Steep in a solution of 2 parts of verdigris, and 1 of sal ammoniac. *Observe* not to use a metallic vessel for the above.

4. (*Purple.*) *a.* Steep in a weak solution of terchloride of gold.

b. Boil for 6 hours in a decoction of 1 lb. of logwood in ½ gallon of water, adding more water, as it wastes by boiling, then add 2 oz. of alum, and boil for 1 hour more.

5. (*Yellow.*) *a.* Boil for 1 hour in a solution made with 1 pound of alum in 1 gallon of water, then take out the pieces and steep them in a decoction made with ½ lb. of turmeric in 2 quarts of water; lastly, mix the two liquors and boil them therein for 1 hour.

b. Steep the pieces for 24 hours in a solution of sugar of lead, then take them out, and when dry, immerse them in a solution of chromate of potassa.

c. Dissolve as much of the best orpiment in water of ammonia or hartshorn, as it will take up, then steep the pieces therein for twenty-four hours; lastly, take them out and dry them, when they will turn yellow. *Remark.* By diluting the solution with water, any shade of yellow may be made.

6. (*Blue.*) *a.* Stain them green, then steep them in a hot and strong solution of pearlash.

b. Boil them in a strong decoction of logwood, and afterwards steep them in a solution of blue vitriol.

c. Steep them for a short time in a weak solution of sulphate of indigo, to which a little salt of tartar has been added; or, still better, boil them in a dyer's green indigo vat. *Remarks.* The bones of living animals may be dyed by mixing madder with their food. The bones of young pigeons may thus be tinged of a rose color in 24 hours, and of a deep scarlet in 3 days; but the bones of adult animals take a fortnight to acquire a rose color. The bones nearest the heart become tinged soonest. In the same way extract of logwood will tinge the bones of young pigeons purple. (Mr. Gibson.)

BONE GREASE. *Prep.* By bruising and boiling the refuse bones of the kitchen, and skimming the broth when cold, from ¼ (?) to ⅓ of their

weight of good fat may be obtained, fit for culinary purposes when fresh, but always excellent for making soap and candles. (Proust.)

BONE GLUE. *Syn.* Gelatine. *Prep.* This is made by dissolving out the earth of bones, previously boiled for the grease, washing the remaining jelly with water, then boiling it with a little water, and forming it into cakes for sale. (See Glue.)

BONE MANURE. For this purpose the bones are ground to a coarse powder in a mill, and sowed along with the seed in a drill. It is said that wheat thus treated yields 30 to 50 per cent. more in weight of straw and grain than by the common methods. It is usually applied to light or turnip soils, which it renders more than ordinarily productive. Bone manure is much used in the west of Yorkshire, Holderness, and Lincolnshire. The usual quantity per acre is 70 bushels, when used alone; but when mixed with ashes, as common manure of any sort, 30 bushels per acre is thought quite enough. It is applied at the same periods as other manure, and has been found in this way to remain 7 years in the ground. The rough part of this manure, after being 5 years in the ground, has been gathered off one field and thrown upon another of a different soil, and has proved, even then, good manure.

BONES, (in Cookery.) The bones of good meat form most excellent materials for making soups and gravies, as is well known to every good cook. In France, soup is extensively made by dissolving bruised bones in a steam heat of 2 or 3 days' continuance, and also by dissolving out the earthy part by digestion in weak muriatic acid, when a lump of gelatine is obtained, which after being well washed with water will dissolve by boiling, and is equal to isinglass for all the purposes of making soups and jellies. Proust has recommended the following process for making the best of bones, in hospitals, jails, and similar establishments:—Crush the bones small, then boil them for 15 minutes in a kettle of water, cool, and skim the fat off, which varies from $\frac{1}{8}$ to $\frac{1}{4}$ (?) of the weight of the bones employed, and when fresh is fit for all common purposes. The bones are then ground, and boiled in 8 to 10 times their weight of water, of which that already used must form a part, until $\frac{1}{8}$ is wasted, when a very nutritious jelly is obtained. A copper vessel should not be used, as the jelly acts upon this metal. An iron Papin's digester is the most suitable. The bones of boiled meat are nearly as productive as those of fresh meat, but roasted meat bones scarcely afford any jelly. (Dr. Young.) As boning meat before cooking is now a very general practice, a quantity of fresh bones may always be had.

BONE SHAVINGS. *Syn.* Bone Dust. Bone Turnings. These yield a beautiful jelly by boiling with water, nearly equal to that produced from hartshorn shavings, for which they are very frequently sold.

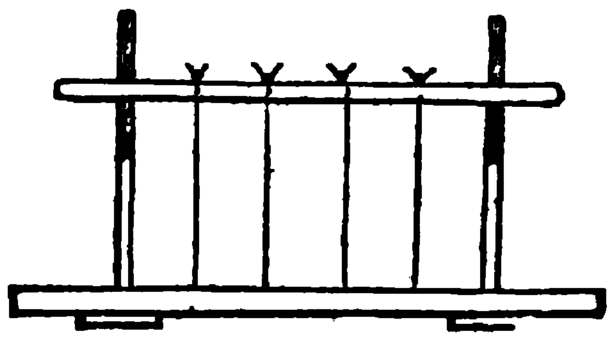
BOOKBINDING. The process of binding books may be divided into several distinct operations, which, in large establishments, are usually performed by different persons, such a method being found to produce greater expedition and better work, than when the whole is done by one person.

The sheets received from the hands of the printer are—

1. *Folded*, which is done correctly by observing the marks or catchwords at the bottom of the pages. As the sheets are folded they are laid upon each other in proper order, and are ready to undergo—

2. *The operation of beating.* This is performed by laying them upon a large stone, and striking them with a heavy smoothed-faced hammer, or by passing them through a rolling press. The former method is usually adopted in the small way, and the latter on the large scale.

3. *The sheets are next fastened to bands*, which is done by taking the folded sheets up one by one, and sewing them to pieces of cord, stretched in a little frame screwed or fastened to the counter or table, called the sewing-press. (See eng.) The



number of bands used, is generally 6 for a folio, 5 for a quarto, and so on proportionally, less than 4 seldom being employed even for small sizes. The ends of the cords being cut off to within about 2 inches of the back, the sheets are ready for—

4. *Glueing.* The back being knocked into shape with a hammer, and the sheets placed in the cutting press, which is then slightly screwed up, melted glue is thinly and evenly applied. After a short time the book is removed from the press, and the back properly adjusted with a hammer, when it is again put into the cutting press, where it is screwed up very tight, and is then ready for—

5. *Cutting.* The instrument employed for this purpose is of a peculiar shape, and called a plough or plough-knife.

6. *Affixing the boards. The bands*, are now scraped out fine at the ends, and the pasteboard to form the covers is fastened thereto, and is then properly adjusted, and shaped with a large pair of shears. The edges now undergo the operation of—

7. *Sprinkling*, or other adornment. The first is performed by a stiff brush of hog's bristles, dipped in the color; the brush being held in the one hand, and the hairs moved with the other.

8. *The external covering of leather, fancy cloth, or paper*, is now applied, having been previously well soaked in paste, to make it properly adhere. One or more of the blank leaves of the book are next pasted against the inside of the cover, to screen the ends that are turned over, when the book is finished; or for choice work, is handed to a "*finisher*" for—

9. *Lettering, gilding, &c.* Gold-leaf is applied by means of white of egg, the pattern being given by pressure with heated brass tools, having the design or letters on their surfaces. The whole is then glazed over and polished.

Remarks. The succession of some of the above operations sometimes varies with the workmen and

the nature of the binding. The above must therefore only be regarded as a short and general outline of the process. If the reader will accompany the perusal by an examination of a bound book, the whole will be rendered quite familiar.

The following varieties of binding may be noticed:

a. Boards. A book, loosely done up without cutting the edges, and covered with paper or cloth, is said to be in boards.

b. Cloth-binding. This style of binding is that in which the majority of works are now issued. It admits of great neatness and even beauty, and is very durable and cheap. *Proc.* The prepared cloth, cut by a pattern to the size suited to the volume, is passed rapidly through a rolling press, between engraved cylinders of hardened steel, which print the pattern in relief. Paste is now applied to the cloth, when it is placed over the volume, previously prepared to receive it. Books in cloth-binding are not commonly cut at the edges, unless highly finished.

c. Dutch binding. This species of binding is distinguished by the backs being of vellum.

d. French binding. This consists in pasting a piece of parchment over the back of the book, between each band, and pasting the ends upon the inside of each cover.

e. Half-binding. Books forwarded in boards, and finished with leather backs and corners, are called "*half-bound.*"

f. Hancock's patent binding. In this method the sheets are folded in double leaves, and being properly placed together and adjusted, the book is subjected to the action of a press, and a strong solution of Indian rubber is smeared over the back with the finger. The operation is repeated, as often as necessary, when fillets of cloth are cemented on with the varnish, and the book is ready to have the boards attached. Thus several of the common operations of binding are dispensed with. I willingly bear testimony to the strength and durability of this method, and the great convenience it affords in allowing the books to open perfectly flat upon a table, or to be distorted in any possible manner, without injury to their backs. It is the best way of binding books for travellers. I once had a large trunk of books, among which was one bound on Hancock's plan. All the rest were nearly torn to pieces by a few months' journey, but this one was uninjured.

g. Law binding. A strong method applied to law books.

h. Leather binding. *Proc.* Immerse the leather in water; after which wring it, and stretch it on a board; place the book with the boards extended thereon, and cut out the cover, allowing about half an inch larger than the book, to turn over the inside of the pasteboards. Pare the edges of the cover very thin all round on a marble slab, and paste it well; glue the back of the book, and spread the cover on the board.

Let the pasteboards be properly squared and even; put the book on the cover, which draw on very tight. Rub the cover smooth with a folding-stick, and turn it over on the inside of the pasteboards on the fore edge. The corners on the inside must be cut and neatly pressed down; tie a piece of thread round the book, between the boards and head-bands, draw up the leather on the back, if necessary, to cover the top of the head-bands; rub the back very smooth with a flat folding-stick, and place it at a distance from the fire to dry.

Rough calf must be damped on the grain side with a sponge and water before pasting and covering.

Russia leather must be well soaked in water fo an hour, taken out, well beaten, and rubbed; afte which the paste must be well worked into the flesl side before covering.

Morocco must be grained by rubbing it on a board, with the grain side inside, and after being pasted, left to soak for a quarter of an hour, and the cover then drawn on with a piece of woollen cloth to preserve the grain.

Roan may be either soaked in water or left to soak when pasted.

i. Italian binding. This is a common variety of binding employed in Italy, (hence its name,) in which the books are covered with a kind of thick coarse paper. In Italy it is called "*alla rustica.*"

k. Marble binding. Named from the design of the exterior.

l. Palmer's patent binding. This consists in applying small brass bars, linked together, to the back of the book, in such a manner that they make the different sections of the book, when open, parallel with each other, and thus admit of writing, without inconvenience, on the ruled lines near the back.

m. School binding. The following is a strong method for school books:—When the books have been cut, colored, and backed, cut off the part of the bands intended to be laced to the pasteboards, and glue on the back a piece of strong smooth linen cloth, which must reach within half an inch of the head and foot, turning on the sides about an inch; paste the boards on each side of the cloth, fixing them close in at the groove, and give the books a firm pressing in the standing-press till dry. Square the boards, glue the backs, and cover and finish in the usual manner.

This method will secure and give strength to the joints, so as effectually to prevent the leather from breaking, and require no more time than lacing in the bands. The edges may now be colored, sprinkled, or marbled, as required.

n. William's patent binding. This consists in placing a back, of a curved form, turned a little at the edges, and made of iron, copper, brass, wood, ivory, or any other material of sufficient firmness. This back is adjusted to the book before it is bound, in such a manner that it may just cover, but not press upon the edges, and is fastened on by enclosing it in vellum or ferret wrappers, which are pasted down upon the boards or drawn through them. The effect is, to make the book open evenly and freely, and to prevent it from spreading on either side.

BOOTS, TO CLEAN. To do this in the best style always use "boot-trees," employ but little blacking, and brush it off while damp. The dirt should, of course, be carefully brushed off before applying the blacking.

BOOTS AND SHOES, WATERPROOF COMPOSITION FOR. *Prep.* Boiled oil 1 pint; oil of turpentine, black rosin, and bees' wax, of each 3 oz. *Proc.* Melt the wax and rosin, then stir in the oil, remove the pot from the fire, and when it has cooled a little, add the turpentine.

II. Take 3 oz. of spermaceti, and melt it in a pipkin, or other earthen vessel, over a slow fire; add thereto 6 drachms of Indian rubber, cut into slices, and these will presently dissolve. Then add *seriatim* of tallow 8 oz.; hog's lard 2 oz.; amber varnish 4 oz. Mix, and it will be fit for use immediately. *App.* The boots or other material to be treated, are to receive two or three coats, with a common bladking brush, and a fine polish is the result.

BOOT-TOP LIQUID. *Prep.* I. Oxalic acid and white vitriol of each 1 oz.; water 1½ pints. *Proc.* Dissolve and apply with a sponge to the leather previously washed with water, then wash the composition off with water, and dry. This liquid is poisonous.

II. Mix in a vial, 1 drachm of oxymuriate of potass, with 2 oz. of distilled water; and when the salt is dissolved, add 2 oz. of muriatic acid. Then shake well together, mix in another vial 3 oz. of rectified spirit of wine with ½ an oz. of the essential oil of lemon, unite the contents of the two vials, and keep the liquid, thus prepared, closely corked for use. This liquid should be applied with a clean sponge, and dried in a gentle heat; after which, the boot-tops may be polished with a proper brush, so as to appear like new leather.

III. Sour milk 1 quart; gum arabic 1 oz.; juice of 2 lemons; white of 2 eggs; oil vitriol 2 oz. Mix.

IV. Sour milk 1 quart; butter of antimony, cream of tartar, tartaric acid, and burnt alum, of each 2 oz. Mix.

BORACIC ACID. *Syn.* Sedative Salt. Sed. Salt of Vitriol. Sed. Salt of Homberg. *Prep.* Dissolve borax in 4 times its weight of boiling water, then add sulphuric acid to the solution until it acquires a distinct acid reaction, (about ¼ the weight of the borax.) As the solution cools, crystals of boracic acid will be deposited. These crystals must be then placed on a filter, and washed with a little cold water. They may be still further purified by solution in boiling water and recrystallization.

Remarks. Even after this treatment, the crystals are apt to retain a little sulphuric acid or sulphate of soda, which can only be got rid of by heating them in a platinum crucible, before redissolving them and crystallizing the second time, as above described. When wanted perfectly pure for chemical analyses, this plan must be always adopted.

The boracic acid of commerce is extracted from the acid lagoons of Tuscany.

Prep. As thus obtained, this acid is soluble in 25 times its weight of cold, and 3 times its weight of boiling water. Very soluble in alcohol, which then burns with a bright green flame, offering a sure test of the presence of boracic acid. Odorless, and tastes bitter. Reddens litmus, but browns turmeric paper. It was once administered internally in large doses, (by Cullen,) but is now scarcely ever employed as a medicine.

BORATE. A compound, formed of the preceding acid and one of the bases.

Prop. The boracic acid has but a feeble affinity for the bases; most of the borates being decomposed by the stronger acids, the former being liberated in a free state. *Prep.* Many of them may be formed by digestion of the hydrate of the base in a solution of the acid, with the assistance of heat, or by double decomposition.

Tests. I. By digestion in slight excess of oil of vitriol, evaporating to dryness, powdering, and dissolving in alcohol, the latter will acquire the property of burning with a green flame. II. If to a strong and a hot solution of a borate, sulphuric acid be added in excess, crystals of boracic acid will form as the liquor cools.

BORATE OF MERCURY. *Prep.* I. Neutral borate of soda 265 grs.; calomel 222 grs.; grind together in a mortar, with a little water, then fill the mortar up with hot water; collect the red precipitate; wash and dry.

II. Add a solution of borax to a solution of quicksilver in nitric acid. Collect the precipitate as before. (White.)

BORATE OF SODA. I. (*Neutral borate.*) *Prep.* Saturate boracic acid in solution with carbonate of soda, at a boiling heat. (Berzelius.)

II. (*Biborate.*) This salt, often erroneously called borate and subborate, is the borax of commerce, and is a natural production. (See Borax.)

BORAX. *Syn.* Biborate of Soda. Borate of Soda. Subborate of Soda. Refined Borax. Crude borax is a natural production, and after being refined, forms a large portion of the borax of commerce. In its rough state it is called *crude borax, tincal, tincar,* &c. It is found crystallized on the edges and shallows of a brackish lake in Thibet, during the winter. It is also prepared by saturating the native boracic acid of Tuscany with soda. The market being literally overloaded with the former article, its price has fallen so low as to allow of its employment for this purpose with great advantage. A valuable paper on this subject, by M. Payen, appeared in the "Ann. de Chimie et de Phys." for July, 1841; and a translation of the same in "The Chemist," vol. ii. 368, to which the reader is referred for a complete account of this process.

The best Tuscany boracic acid contains only 50 per cent. of real boracic acid, and yields no more than 140 to 150 per cent. of good borax.

Prop., Use, &c. It is extensively employed as a flux for metals, for soldering, and in medicine. Internally it is diuretic, sedative, emmenagogue, and cooling, in doses of 15 to 40 grains; externally as a gargle for sore throat, and in powder as a detergent in aphthæ, and ulcerations of the mouth. Dissolved in rose-water, it is used as a cosmetic, and mixed with 8 times its weight of lard, forms a useful piles ointment.

Tests. These are the same as for the borates, which see. It reddens turmeric paper, and, before the blowpipe, fuses into glass, which may be tinged red by terchloride of gold, and blue by cobalt.

Pur. The purity and strength of borax are best ascertained by determining the quantity of sulphuric acid required to neutralize a given weight, as indicated by litmus paper. Common salt and alum are frequently mixed with borax to lower the value. The former may be detected by dissolving the borax in hot water, when a solution of lunar caustic will give a curdy white precipitate, soluble in ammonia; and the latter by water of ammonia, which will give a bulky white precipitate. The

former must be distinguished from the white pulverulent precipitate of borate of silver, which will be thrown down from pure borax.

BORAX, GLASS OF. *Prep.* Dry borax with a gentle heat, breaking down the froth as it rises, then melt it by increasing the heat until it runs into a glass. *Use.* In soldering, and as a blowpipe flux.

BORO-FLUORIDE OF HYDROGEN.—*Prep.* Pass fluoboric acid gas through water, and afterwards carefully concentrate the solution; cool and separate the crystalline powder from the solution, which is the boro-fluoride of hydrogen. *Prop., &c.* With most of the protoxides it interchanges bases, and metallic boro-fluorides result.

BORO-FLUORIDE OF BARIUM. *Prep.* Add carbonate of baryta to boro-fluoride of hydrogen, until it ceases to be dissolved; evaporate to the consistence of a sirup, when crystals will form. *Remarks.* The boro-fluoride of calcium, magnesium, and lead, may be formed in a similar way.

BORO-FLUORIDE OF POTASSIUM.—*Prep.* Drop boro-fluoride of hydrogen into a solution of carbonate of potassa, collect the white powder that falls, and wash it with cold water.

BORO-FLUORIDE OF SODIUM. *Prep.* Dissolve fluoride of sodium in boro-fluoride of hydrogen, and crystallize. *Remarks.* Boro-fluoride of lithium may also be formed in a similar way.

BORON. The base of boracic acid, discovered by Sir H. Davy, in 1807, by means of the galvanic battery of the Royal Institute.

Prep. Potassium, and perfectly dry boracic acid, or still better, boro-fluate of potassa, intimately mixed together, are to be placed in an adopter, or glass tube, and submitted to a low red heat. When cool, remove the loose cork that fastened its mouth, and pour in successive portions of hot water, until the whole matter is detached and dissolved. Collect the liquid and allow it to settle, then wash the precipitate, first with a solution of sal ammoniac, and finally, with alcohol; next dry the boron in a capsule, and put it into a well-stopped vial.

Prop., &c. A solid, tasteless, and inodorous powder, of grayish-brown color. With sulphur it unites at high temperatures, forming sulphurets; and when placed in chlorine gas it spontaneously inflames, and a gaseous chloride is produced. This gas may also be made by exposing calcined borax and charcoal at a red heat to the action of dry chlorine.

BOTTLE, RED. *Syn.* TAYLOR'S RED BOTTLE. WHITWORTH DOCTOR'S RED BOTTLE. *Prep.* British brandy 1 quart; powdered cochineal ½ oz.; oil of origanum 10 drops. Digest for 24 hours and filter.

BOUGIE. *Syn.* CANDELA. CANDELA CEREA. CANDELULA. VIRGA CEREA. CEREA. CEREOLA. CEREUS. CEREOLUS. A long slender instrument, introduced into the urethra, œsophagus, or rectum, to overcome strictures of those canals. The word bougie is the French for a wax candle.

Prep. I. Add 3 parts of boiled linseed oil to 1 part of melted amber, and when mixed add 1 part of oil of turpentine; spread the mixture at 3 successive intervals upon loose spun silk cord or web, dry in a heat of 150°, and repeat the process until the instrument has acquired the proper size, then polish, first with pumice-stone, and afterwards with tripoli and oil.

Remarks. The above is the original receipt of the French professor Pickel, and is still generally used, slightly modified, on the continent.

II. Add to the oil and amber melted together, as last, caoutchouc in the proportion of $\frac{1}{16}$ of the weight of the oil employed; when dissolved, remove the vessel from the fire and proceed as before.

Remarks. This is the plan usually adopted at Paris, and for the best elastic bougies this process usually occupies from 6 to 8 weeks. When the bougie is wanted to be hollow, a piece of polished metallic wire is introduced into the axis of the silk, or tinfoil is rolled round the wire and the composition applied as before. When dry and hard the wire is withdrawn.

III. (*Caoutchouc, or elastic gum bougies.*) *a. In France* these are made by applying a solution of Indian rubber in ether, to the silk or foil prepared as above.

b. In England, where ether is expensive, naphtha is employed, or slips of Indian rubber previously boiled in water, or that have had their edges softened with ether, are wound round the wire or foil, and kept in their place by a piece of tape applied over them, as in making elastic tubes. They are afterwards carefully smoothed off.

IV. A common kind of bougie is made by dipping pieces of catgut or soft linen into lead plaster, melted, and rolling it while yet warm upon a slab. *Very inferior.*

V. (*White.*) *Prep.* Yellow wax 1 lb.; spermaceti 1 oz.; finely-powdered sugar of lead ¾ oz.; melt and spread upon slips of old linen, then roll them up while warm with the spread side outwards.

VI. (*Bell's.*) Lead plaster 1 lb.; yellow wax 8 oz.; olive oil 2 oz.; *as last. Very inferior.*

BOUILLI. (French for boiled meat.) This name has been applied by cooks to several dishes of boiled meat, as a refinement on the plain English. Thus "beef bouilli, beef in bouilli, &c.," means, stewed or boiled beef, &c. As, however, the name is à la françaís, so must be the accompaniments, which generally consist of herbs and vegetable seasoning in greater quantity and variety than is usually deemed essential to a plain-spoken piece of boiled or stewed meat!

BOULES DE NANCY. Equal parts of iron filings and red tartar, made up into balls with spirit. *Use.* As a tonic dissolved in hot water.

BOUQUET DE LA REINE. *Prep.* I. Essence of bergamotte 1 drachm; English oil of lavender 23 drops; oil of cloves and aromatic vinegar, of each 8 drops; essence of musk 10 drops; alcohol ½ oz. Mix.

II. Oils of bergamotte and lavender 30 drops each; neroli 15 drops; oils of verbena and cloves, of each 5 drops. Essences of musk, ambergris, and jasmin, of each ½ drachm; rectified spirit of wine (strongest) 1 oz. Mix.

BOX WOOD MAHOGANY. *Prep.* Warm the wood by the fire, then wash it over with aquafortis, let it stand 24 hours to dry, and polish it with linseed oil reddened with alkanet root, or give it a coat of varnish, made by dissolving aloes and annotto in spirit of wine.

BOYLE'S FUMING LIQUOR. Hydrosulphuret of ammonia is usually employed and sold for this article, but the liquor prepared by Boyle's process contains an excess of sulphur. (Gay Lussac.) The properties of both are however the same.

Prep. Mix 4 parts of fresh slaked lime; 2 of sal ammoniac, and 1 of sulphur, then submit the mixture to distillation.

BRA GRAS. Tar, black rosin, and the dregs of strained rosin, melted together.

BRAIN CAKES. *Prep.* Clean, wash, blanch, and soak the brains, then beat them up with a little white pepper and salt, a sage-leaf or two, scalded and finely chopped, and the yelk of an egg; make them into small cakes or fritters, and fry them.

BRAN. The husk of wheat which immediately covers the grain, and which is left in the bolting machine. *Use.* It is largely employed by the calico printers, when diffused through hot water, to remove the coloring matter from those parts of their goods which are not mordanted. A handful mixed with a pail of warm water, forms an excellent emollient foot-bath. Infused in water, (*bran tea,*) and sweetened, it forms a popular demulcent, much used in coughs and hoarseness, and, taken in quantity, proves gently laxative. It also forms an excellent manure, and, from containing the ammoniaco-magnesian phosphate, is especially adapted for potatoes. It is frequently mixed with flour and made into bread, by the poorer orders.

BRANDY. *Syn.* Eau de Vie. Aqua Vitæ. Spiritus Gallicus. Brandy-wine. The spirituous liquor obtained by the distillation of wine. When first distilled it is colorless, and only acquires a yellowish tint from the wood of the casks, in which state it is known and sold as pale or white brandy. The deep color that it usually possesses, is imparted to it by adding a little spirit coloring, (burnt sugar or caramel,) and occasionally a little red sanders wood as well, and is intended to imitate the appearance acquired by brandy from great age, when kept in wood. The natural color, however, which the spirit receives from the cask, no matter how long it may have been in it, never exceeds an amber tint, about the common color of pale Jamaica rum; but the public taste has been gradually vitiated in this respect, until only a spirit of a lively and full "*brandy color*" (unless for a pale brandy) will sell.

The brandies most esteemed in England are imported from France, and are those of Cognac and Armagnac, the preference being generally given to the former. The brandies of Rochelle and Bordeaux may be reckoned next in quality, while those obtained from Portugal, Spain, and Italy are very inferior.

The constituents of brandy are alcohol and water, and small quantities of volatile oil, acetic acid, acetic ether, œnanthic ether, coloring matter, and tannin. It is from the presence of the last six of these substances that the spirit derives its distinguishing smell and flavor. The quantity of alcohol present in brandy varies from 48 to 55 per cent. When first imported, it is generally 1 or 2 overproof, but by age its strength is lessened, and by the time it is usually taken from the bond store for sale, seldom exceeds 3 or 4 underproof. From considerable personal acquaintance with the cognac trade, I feel confidence in asserting, that brandies of the best quality seldom exceed proof, and are generally below it, and that it is a common practice in France to add spirit of wine and coloring to raise the strength to any given point desired by the English purchaser, and to charge the same in the invoice; or where the purchaser is not *well acquainted with the subject,* and desires a strong spirit at a low rate, to sell him brandy so mixed as genuine. The very finest brandies average from 5 to 10 u. p., and never exceed about 2 u. p.; they then contain more than $\frac{1}{2}$ their weight of water, and from their boiling point being higher, they come over more highly charged with essential oil, and other volatile and fragrant principles of the grape, and thus possess in a greater degree that peculiar aroma and flavor for which they are so much esteemed. French brandy or wine, distilled at a low temperature in a water bath, yields a very pure and scarcely flavored spirit.

The quality of the brandy imported from France varies considerably from that which is drunk on the continent, principally from its being *prepared,* or, as it is technically termed, "*made up,*" for the London market, which means lowering it by the addition of spirit, coloring, &c. above described. The common strength at which foreign brandy is sold in England is about 11 or 12 u. p., and below 17 u. p. it becomes seizable by the excise. The strength at which it is sold and permitted in trade, is generally 10 u. p., to which it is reduced by adding water, and never less than 12 u. p., unless it be specially agreed upon. In large quantities and from bond, of course the strength depends much upon the age and quality of the spirit. A fine old brandy being, perhaps, 8 or 10 *u. p.*, while one of the last year's vintage of a commoner quality may be as strong as 2 or 1 *u. p.* But these distinctions are familiar to every experienced brandy dealer.

In France there are several varieties of this spirit distilled, which are known by names descriptive both of their quality and source. The "*eau de vie supérieure,*" or *cognac brandy,* is generally obtained from pale white wines, by careful distillation, and is remarkable for its superior flavor. When kept in glass or stone bottles, it is called white cognac brandy, and the same term is also generally applied when it has been kept in casks, but has not been artificially colored; in the latter case, however, it generally acquires a pale amber tint.

The "*eau de vie ordinaire,*" or *common brandy,* is distilled from high-colored white or red wines, and has generally a sp. gr. of 0·948, and varies from 22 to 27 u. p.

The "*eau de vie de marc*" is obtained from the lees of vinegar and other wines, the marc or cake of grapes from which the juice has been pressed, and the commonest red wines, fermented and distilled together by a quick fire, to drive over as much essential oil and flavoring as possible.

The "*eau de vie seconde*" is the weak spirit that passes over after the stronger spirit has been drawn off, and the receiver changed. *It is used* for common drinking, or mixed with other brandy.

The "*eau de vie à preuve d'Hollande*" is brandy about 19° Baume, or sp. gr. ·9420, the common strength at which it is retailed in France, and will stand the "*proof*" or "*bead.*"

The "*eau de vie à preuve d'huile*" is the strongest brandy usually drunk; it is about 23° Baume, or sp. gr. ·918; pure olive oil will just sink in it; hence the above term.

The "*eau de vie fort*" is usually prepared by the redistillation of common brandy, keeping the first portion separate. It answers to our spirit of wine. It is made of 12 different strengths, distinguished by names, exhibiting the quantity of water required to reduce the sample to the "*preuve d'Hollande.*" The weakest is called cinq-six, or $\frac{5}{6}$, and the strongest trois-neuf, or $\frac{3}{9}$, the difference between the numerator and the denominator being the quantity of water the 3 parts of the former will take to reduce it to the "*preuve,*" when it would make 9 parts. Its sp. gr. is about ·839.

The *esprit de vin* is brandy or spirit rectified to 0·890 and upwards.

The general method of distilling brandy in France differs in no important particular from that practised in England, for grain or molasses spirit. Neither are the French workmen more skilful nor more cleanly in their operations than the English. It is the materials alone that, in this case, conduce to the superiority of the product. The quality of the brandy varies with that of the wine from which it has been distilled. Every soil, every climate, every kind of grape, produces a wine possessing some peculiarity confined to itself, and this wine on distillation produces a spirit possessing like distinctions. A large quantity of brandy is prepared in France soon after the vintage, as the juice of the poorer grapes that is unfit for wine is fermented and at once distilled. It is a general rule, in France, to distil only such wines as are unsaleable, as the profits on the wine, sold as such, are much greater than when it is converted into brandy.

The Strength of Brandy may be ascertained in the same way as alcohol, for which purpose Sike's hydrometer is used in England. In France, from the value of spirit being less, it is frequently tested by simpler methods, though great accuracy obtains, in this particular, where necessary.

Pur. Very little perfectly pure French brandy is obtained by the small consumer in England, as it is not only generally lowered a little by the wholesale dealer, but undergoes a like process at the hands of the retailer. The safest method is either to procure it direct from the bond store, without its even entering a private cellar, or to buy of some known respectable party, and to pay a price that will offer no inducement to dishonesty. If this be not done, by all means buy British brandy, which is now made of excellent quality by many of the leading houses, as *Betts*, *Bretts*, *Booth*, and *Grimble*. From the two former a single sealed bottle may be procured at the same price as by the gallon.

The importation of foreign brandy for home consumption amounts to about 1,400,000 gallons a year.

BRANDY, (REDUCED.) I. To 20 gallons of Cognac brandy add 5 gallons of the best British brandy.

II. To 72 gallons of full-flavored French brandy, add 10 gallons of spirit of wine, (58 *o. p.*,) 8 gallons of water, and 1 pint of good coloring. Rummage well up and let it stand until the next day. *Remarks.* The above reduction is generally adopted in trade, and is known by the name of "*improving.*" But such is the poverty of the palate of the English brandy drinker, that the adulteration is often not suspected, even when it is carried to double the extent of the above, which is generally exceeded in the hands of the retailer. So long, however, as the foreign spirit constitutes about half of the mixture, and was at first of decent quality and age, the infatuated Englishman smacks his lips, and cunningly holding up his glass between the light and his eye, exclaims, "*Ah! this is a drop of the real.*"

BRANDY, (BRITISH.) *Syn.* British Cognac. Imitation Cognac, &c. From the heavy duty levied on French brandy imported into England for home consumption, it has become a desideratum with the distiller (rectifier) to produce an English spirit of a similar description. For some time the attempt proved quite unsuccessful, but of late years much capital and talent have been embarked in the pursuit, and the result has proved very satisfactory. An article of British manufacture may now be purchased, at a very reasonable rate, of really respectable quality, and possessing much of the flavor and aroma of foreign brandy, while, as a beverage, it is equally wholesome. Much of the British brandy, however, that is commonly met with, is of such a wretched quality as to be quite undeserving of the name, which is evidence of the fact, that much skill and experience is required to ensure success in its manufacture. For a long time this liquor was distilled from spoilt wine and dregs of wine, both British and foreign, mixed with beer bottoms and similar articles; and when, instead of these, corn, malt, and molasses spirit were employed, it was considered as an unpardonable and wicked misuse of those articles. Modern experience has proved, however, that perfectly pure and tasteless malt spirit is the best article to form into an imitation brandy.

The following formulæ, by skilful management, will produce very good brandy, but it must be recollected that much depends on the quality of the materials employed, as well as on the operator. As the strength and quality of the ingredients, and the methods of manipulation vary, so will the result; much must therefore be left to the judgment and discretion of the artist. It offers a profitable pursuit to the ingenious and industrious chemist and rectifier.

Prep. I. Take 12 gallons of the finest flavorless malt spirit at proof, (or if of a different strength a proportionate quantity;) add thereto 5 gallons of water, $\frac{3}{4}$ lb. of the best crude red tartar or winestone, previously dissolved in 1 gallon of boiling water; $\frac{1}{4}$ pint of acetic ether; 2 quarts of good French wine vinegar; 7 lbs. of bruised French plums, and 1 or 2 gallons of wine bottoms or flavor stuff from Cognac, mix them in a fresh-emptied sherry cask, and let them stand together for 14 days, frequently rummaging up the liquor with a stick; next draw over 15 gallons of the mixture from a still furnished with an agitator. Put the rectified spirit into a clean, fresh-emptied Cognac brandy cask, and add thereto $\frac{3}{4}$ pint of tincture of catechu, 1 lb. of fresh and clean oak shavings, and about a pint of good spirit coloring. Bung close, and agitate occasionally for a few days. *Remarks.* Age improves the above article, and renders it

(provided the process be well managed) of a very superior quality. The above receipt yields 15 gallons of brandy 17 *u. p.* The following forms may also be recommended:—

II. Perfectly pure spirit, pf. 99 gallons; red tartar, dissolved, 7 lbs.; acetic ether 3 lbs.; wine vinegar 3 gallons; bruised raisins, or French plums, 7 lbs.; bitter almonds, bruised, 1 oz.; water sufficient. Dissolve the tartar in the water, then add the other ingredients, macerate as before, and draw over 120 gallons; lastly, add a few lbs. of oak shavings, 1 lb. of powdered catechu made into a paste with water and burnt-sugar coloring as before. *Remarks.* This yields 120 gallons of spirit fully 17 *u. p.*

III. Clean spirit 17 *u. p.*, 100 gallons; nitric ether 2 quarts; cassia buds, ground, 4 oz.; bitter almond meal 2 oz.; orris root, sliced, 6 oz.; powdered cloves 1 oz.; capsicum 1½ oz.; good vinegar 2 gallons; brandy coloring 1 quart; powdered catechu 1 lb.; full-flavored Jamaica rum 2 gallons. Mix well in an empty Cognac cask, and let them macerate for a fortnight, occasionally stirring. *Remarks.* The proportion of the ingredients may be varied by the skilful brewer, as much depends on their respective strengths.

IV. Good plain malt spirit, 17 *u.p.*, 100 gallons; finely-powdered catechu 12 oz.; tincture of vanilla 4 oz.; burnt-sugar coloring 1 quart; good rum 3 gallons, or more; acetic or nitric ether 2 quarts. Mix well.

V. Clean spirit, 17 *u.p.*, 89 gallons; high-flavored cognac 10 gallons; oil of cassia 1½ drachms; oil of bitter almonds, essential, ½ a drachm; powdered catechu 10 oz.; cream of tartar, dissolved, 16 oz.; Beaufoy's concentrated acetic acid 3 lbs.; sugar coloring 1 quart, or more; good rum 1 gallon. Put the whole into a fresh emptied brandy piece, and let them remain a week together, with occasional agitation, then let them stand to settle. If this mixture be distilled, the French brandy, rum, coloring, and catechu, should not be added till afterwards.

VI. To colored plain spirit at 17 *u.p.*, add a little tincture of catechu, and a sufficient quantity of essential oil, distilled from wine lees, to give it a proper flavor. This oil is obtained by distillation from the wine lees, either dried and made up into cakes, or in their wet state mixed with about 7 times their weight of water. It should be dissolved in alcohol, and kept in this state, as it is apt to lose its flavor. *Remarks.* When this process is well managed a very capital article results, but it requires considerable address to conduct it well. The spirit produced by this plan is better for distillation. The brandy from any part of the world may thus be imitated, by distilling the oil from the lees of the wines produced in the particular district. This is the only method of producing an exact imitation. A pound each of finely-powdered charcoal and ground rice has been recommended to be digested in a gallon of spirit for a fortnight. Where black tea is cheap, as in America, it is very commonly employed to impart the roughness and flavor of brandy to colored spirits.

BRANDY, CHERRY. *Prep.* I. To every gallon of brandy put an equal measure of cherries, bruised between the fingers; steep for 3 days, then express the liquor; add 2 lbs. of lump sugar, and strain for use.

II. To the above add 1 quart of raspberries, and ½ a pint of orange-flower water. *** Quality very fine.

III. Treacle 1 cwt.; spirit (45 u.p.) 41 gallons; bruised bitter almonds (more or less, to taste) 5 oz.; cloves 1 oz.; cassia 2 oz. Put the ingredients into a large cask, well mix and let them lie a month, occasionally stirring.

Remarks. Equal parts of fully ripe Morello and black cherries produce the richest cordial.

BRANDY, CARAWAY. *Prep.* I. Steep 4 oz. of bruised caraway seeds and 2 lbs. of sugar in 1 gallon of British brandy, for a fortnight.

II. Sugar 1 lb.; caraways 1 oz.; 3 bitter almonds; spirits of wine and water, of each 1 quart; (or spirit 22 u.p. ½ a gallon.) Macerate as above.

BRANDY, DANTZIC. This is distilled from rye, ground with the root of calamus aromaticus. It has a mixed flavor of orrice and cinnamon.

BRANDY, LEMON. *Prep.* I. Steep ½ lb. of fresh lemon peel and ½ a dozen lemons, cut in slices, in 1 gallon of brandy, for a week, then add 1 lb. of lump sugar.

II. Proof spirit 7 gallons; essence of lemon 3 drachms; sugar 5 lbs.; tartaric acid 1 oz., dissolved in water 2 gallons; coloring q. s. Mix, and rummage repeatedly for 14 days. *Remarks.* Sometimes milk is added to the above, in the proportion of 1 quart (boiling hot) to every gallon.

BRANDY, MALT. Malt spirit, flavored with sweet spirits of nitre and terra Japonica, and colored with treacle, or spirit coloring. (See Brit Brandy.)

BRANDY, ORANGE. This may be made in a similar way to lemon brandy.

BRANDY, PEACH. *Prep.* I. From peaches, by fermentation and distillation. Much used in the United States, where peaches are very cheap.

II. Bruise the peaches, then steep them in twice their weight of British brandy, or malt spirit; lastly, express the liquor.

III. Bitter almonds (bruised) 2 oz.; proof spirit (light) 10 gallons; water 3 gallons; sugar 5 or 6 lbs.; orange-flower water ½ a pint. Mix, and macerate for 14 days.

*** Color with brandy coloring, if *required* darker.

BRANDY, RASPBERRY. *Prep.* I. Pour as much brandy over raspberries as will just cover them; let it stand for 24 hours, then drain it off, and replace it with a like quantity of fresh spirit; after 24 hours more, drain this off and replace it with water; lastly, drain well, and press the raspberries quite dry. Next add sugar to the mixed liquors, in the proportion of 2 lbs. to every gallon, along with a ¼ of a pint of orange-flower water.

II. Mix equal parts of mashed raspberries and brandy together, let them stand for 24 hours, then press out the liquor. Sweeten as above, and add a little cinnamon and cloves, if agreeable; lastly, strain.

BRASS. An alloy of copper and zinc.

Hist. and Prep. Brass was formerly manufactured by cementing granulated copper, or copper clippings, with calcined calamine and charcoal, in crucibles, exposed to a bright heat. The alloy

was found in lumps at the bottom of the crucible on cooling. These were remelted and cast into ingots. At the present day, brass is generally made by direct union of the metals. This process requires much care, owing to the different degrees of fusibility of copper and zinc. The proper quantity of zinc is first melted, and slips of copper plunged into it, which are rapidly dissolved, as it were, and the addition is continued until an alloy is formed, somewhat difficult of fusion, when the remainder of the copper is added. The brass thus formed is broken into pieces, and remelted under charcoal, and a proper addition of either zinc or copper made, to bring it up to the color and quality desired. It is next cast into plates, or other forms, in moulds of granite. When submitted to the rolling-press for reduction to *thin* plates, it requires to undergo the operation of annealing several times.

Prep. I. (*Fine Brass.*) 2 parts of copper to 1 part of zinc. *Remarks.* This is nearly 1 equivalent each of copper and zinc, if the equivalent of the former metal be taken at 63·2; or 2 equivalents of copper to 1 equivalent of zinc, if it be taken, with Liebig and Berzelius, at 31·6.

II. Copper 4 parts, zinc 1 part. An excellent and very useful brass.

III. (*Gold-colored Brass.*) *Syn.* Red Brass. Dutch Gold. Tombac. Similor. Prince's Metal. Pinchbeck, &c.

a. Copper and zinc, equal parts.

b. Copper 2 parts; zinc 1 or 1½ parts. This is Manheim gold.

c. Copper 3 to 5½ parts; zinc 1 part. Deep colored.

Remarks. The proportion of zinc in this alloy is altered to suit the color and other properties to the purposes for which it is intended, and often varies from ⅛ to ⅕, or ¼ of the weight of the alloy. At the celebrated works of Hegermühl, near Potsdam, the proportions are 11 parts of copper to *two* of zinc, which produces a metal which is afterwards rolled into sheets for the purpose of making Dutch leaf-gold.

BRASS, BUTTON. (*Best.*) I. Copper 8 parts; zinc 5 parts, as above.

II. (*Common.*) Copper 50 parts; zinc 40 parts; tin 4 parts; lead 6 parts.

BRASS, FOR SOLDER. *Syn.* Hard Solder. I. 12 parts of brass; 6 parts of zinc, and 1 of tin, melted together.

II. 2 parts of brass, and 1 of zinc.

III. (*Very strong.*) 3 parts of brass, and 1 of zinc.

BRASS, TURNER'S. 98 parts of brass, and 2 of lead. *Remarks.* The addition of lead improves the brass for the uses of the turner, but lessens its malleability.

BRASS, CLEANING OF. Brass and copper are best cleaned with sweet oil and tripoli, powdered bath-brick, rotten-stone, or red brick-dust, rubbed on with flannel and polished with leather. A strong solution of oxalic acid in water gives brass a fine color. Vitriol and spirits of salts make brass and copper very bright, but they very soon tarnish, and consequently require more frequent cleaning. A strong lye of roche-alum and water will also improve brass.

Brass inlaid work may be cleaned as follows:—Mix tripoli and linseed oil, and dip into it a rubber of hat, with which polish the work. If the wood be ebony or rosewood, polish it with a little finely-powdered elder-ashes; or make a paste of rotten-stone, a little starch, sweet-oil, and oxalic acid, mixed with water. The ornaments of a French clock are, however, best cleaned with bread-crumb, carefully rubbed, so as not to spoil the woodwork. Ormolu candlesticks, lamps, and branches, may be cleaned with soap and water. They will bear more cleaning than lacquered articles, which are spoiled by frequent rubbing, or by acids, or strong alkalis.

BRASS COATING. I. Brass plates and rods may be covered with a superficial coating of brass, by exposing them in a heated state to the fumes of melted zinc, at a high temperature. *Use.* For rolling into thin plates, or drawing into wire. The celebrated spurious gold wire of Lyons is thus made.

II. Vessels of copper may be coated with brass, internally, by filling them with water strongly acidulated with muriatic acid, adding some amalgam of zinc and cream of tartar, and then boiling for a short time.

BRASS-COLORED PIGMENT. *Syn.* Brass Bronze. *Prep.* I. (*Red.*) Grind copper filings, or precipitated powder of copper, with a little red ochre.

II. (*Yellow or gold-colored.*) Gold-colored brass, or Dutch leaf reduced to a very fine powder.

Remarks. Both these powders are mixed up with varnish, and used as a paint. No more should be mixed at a time than wanted for immediate use. They are also used by dusting them over any surface, previously covered with varnish to make them adhere. (See Oxide of Copper.)

BRASS-COLORED VARNISH. *Prep.* Dissolve 1 oz. each of pale shell lac and gum sandarach, in ¼ a pint of rectified spirit of wine.

Use. To mix up the preceding powders.

BRASS, PASTE FOR CLEANING. *Prep.* I. Soft soap 2 oz., rotten-stone 4 oz.; beat them to a paste.

II. Rotten-stone made into a paste with sweet oil.

III. Rotten-stone 4 oz.; oxalic acid 1 oz.; sweet oil 1½ oz.; turpentine enough to make a paste.

Use. To clean brass. The first and last are best applied with a little water. The second, with a little spirits of turpentine, or sweet oil. Both require friction with soft leather.

BRASS ORNAMENTS, PRESERVATION OF. Brass ornaments, when not gilt or lacquered, may be cleansed, and a fine color given to them by two simple processes. The first is to beat sal ammoniac into a fine powder, then to moisten it with soft water, rubbing it on the ornaments, which must be afterwards rubbed dry with bran and whiting. The second is to wash the brass-work with roche alum boiled to a strong lye, in the proportion of an ounce to a pint; when dry, it must be rubbed with fine tripoli. Either of these processes will give to brass the brilliancy of gold.

BRASS STAIN. I. Cut sheet-brass into small pieces, and expose it to a strong heat for 2 or 3 days, then powder it, and again expose it for several days to a like heat; again powder and sift,

and expose it a third time to heat, testing it occasionally, to see if it be properly burnt. When this is the case, a little of it fused with glass will make the latter swell and froth up.

Uses, &c It imparts to glass a green tint, passing into torquoise.

II. Calcine equal parts of plate-brass and sulphur, stratified together in a crucible, until they become friable; then powder and expose them again, as last.

Use. Imparts a calcedony red or yellow tinge to glass by fusion, according to the mode of using it.

BRAWN, CHOICE. When young, the horny parts feel moderately tender; if the rind be hard, it is old.

BRAWN, MOCK. *Prep.* Take the head and belly piece of a young porker, well saltpetred; split the head and boil it; take out the bones and cut it to pieces; then take four ox-feet boiled tender, and cut them in thin pieces; lay them in the belly piece, with the head cut small; roll it up tight with sheet tin, and boil it four or five hours. When it comes out, set it up on one end, put a trencher on it within the tin, press it down with a large weight, and let it stand all night. The next morning take it out of the tin, and bind it with a fillet, put it into cold salt and water, and it will be fit for use; it will keep a long time, if fresh salt and water are put into it every four days.

BRAZIL WOOD. *Syn.* Sapan Wood. Saint Martha Wood. Fernambuca. This wood is much used in dyeing. A decoction is made by boiling for some hours in hard spring water, and this is generally kept for some time, or until it undergoes a species of fermentation, as it is thus found to yield more permanent and beautiful colors than when employed quite new. *Use.* To dye *red.*

BRAZIL WOOD DYE. I. (*For cotton and linen.*) *a.* First boil the goods in a bath of sumach, next work them through a weak mordant of solution of tin, and then run them through the Brazil bath, lukewarm. This gives a bright red.

b. First alum the goods and rinse them, then give them a mordant of solution of tin, rinse again, and turn them through the dye-bath. This gives a rose color.

Remarks. The shades of this dye may be varied by the strength of the bath, mordant, &c. A little alum added to the Brazil-bath, gives a purple tint. 1 lb. of Brazil wood, ½ oz. of alum, and 2 oz. of tartar will dye 20 to 25 lbs. of cotton.

II. (*For silk.*) The silk, after being well alumed in the same way as wool, but at a lower temperature, is rinsed, and passed through the decoction of Brazil, just lukewarm.

Remarks. By adding a little alkali to the bath, or by passing the silk through a water holding a little alkali in solution, after it is dyed, will produce what is called the false crimson. When wanted of a very deep crimson, a little logwood is added to the Brazil-bath. In this way any shade of color may be produced.

III. (*For wool.*) Boil the wool in water holding in solution 5 parts of alum and 1 of tartar, for 1 hour; then let it lie in the cold liquor for several days, frequently moving it about; lastly, boil it in a decoction of Brazil for ½ an hour.

BRAZILINE. *Syn.* Brezilike. The coloring principle of Brazil wood, obtained by Chevreul in small orange-colored needles. It is soluble in both water and alcohol; alkalis turn it violet, acids yellow. With alum it dyes red.

BRAZING. The operation of uniting the edges of pieces of copper, brass, iron, &c., by means of hard solder.

Proc. The edges, after being filed quite clean, are covered with a mixture of hard solder and powdered borax, made into a paste with water. The whole is then allowed to dry, and afterwards exposed in a clear fire to a heat sufficient to melt the solder.

Remarks. In some cases a little silver is added to the solder, when it receives the name of "*silver solder.*"

BREAD. *Principles of bread-making, &c.* This most important article of food is made of the flour of different grains, but only those that contain gluten admit of conversion into light spongy bread. Hence it is that wheat flour is best calculated for this purpose. When flour is made into a stiff paste or dough with water, and rolled into cakes and baked, it forms biscuits, or unleavened bread, which was once the only description known. When the dough, previously to baking, is left for some time in a moderately warm place, varying from 80° to 120°, a state of fermentation comes on, formerly called the panary fermentation, but which is, in reality, the sugar of the flour gradually undergoing the process of conversion into alcohol, and resembles in every respect the same change which takes place in the manufacture of wine, beer, &c. During this process, a large quantity of carbonic acid gas is liberated, and the toughness of the dough preventing its escape, the whole mass becomes puffed up and spongy, and a light porous paste is formed, ready for baking into bread. The natural process of fermenting the dough just described, is, however, subject to much uncertainty, and is inconvenient from the time it occupies to complete it, and the tendency the dough has to run into the acetous fermentation, when it acquires a sour and disagreeable taste, and is rendered less nutritious and easy of digestion. This has led to the use of a *ferment,* which at once excites a proper state of fermentation throughout the mass, and speedily renders it light and spongy. *Leaven* or *dough,* already in a state of fermentation, was originally employed for this purpose, and the bread so made was hence called *leavened bread.* But this has been wholly superseded by barm or yeast. Thus it will be seen that all that is essential to make a loaf of bread, is to add a proper quantity of yeast to the dough, and to allow it to remain for a short time in a warm place, until it rises or becomes spongy, when it must be subjected to the operation of baking. If the process be well managed, and the flour be good, bread of superior quality will be produced.

Process of making bread. In preparing his dough, the modern baker takes a part of the water needed for the batch, and having warmed it to a temperature of about 80° or 90°, dissolves his salt therein, and then adds the yeast and a portion of the flour. These he works up into a dough, which he sets aside in a warm place usually provided for

the purpose, and called the "*kneading trough*," where it soon begins to ferment and swell up. This process is called "*setting the sponge*," and according to the proportion the water in it bears to the whole quantity that is to be used, it receives the name of "*whole*," "*half*," or "*quarter sponge*." The evolution of carbonic acid in the process of fermentation, causes the sponge to heave and swell, and when the surface bursts, it subsides, and then swells again and again in a similar manner. This action would go on for some time, if not interfered with; but the baker is careful to stop it before it has communicated a sourness to the mass. After the *first*, or at the *furthest*, after the second or *third* "*dropping of the sponge*," he adds the remaining quantity of flour, water, and salt, necessary to form the batch. These he incorporates by long and laborious kneadings, until the entire mass acquires uniformity, and is sufficiently tough and elastic to bear the pressure of the hand without adhering to it. The dough is now left to itself for a few hours, during which time fermentation goes on, after which the inflated mass is again kneaded, when it is ready to be cut into pieces and weighed. These pieces are then shaped into loaves, and set aside for an hour or two, during which time they swell up to nearly double their former size; they are then placed in the oven and baked. During this operation they continue for a time to increase in size, in consequence of the dilation of the pent-up gas by the heat of the oven, until at length the fermentation is checked, and the dough becomes too solid to admit of further alteration.

Remarks. A number of other processes are used by cooks and confectioners to make the different varieties of fancy bread, cakes, puddings, &c., most of which vary according to the peculiar characteristic it is desired to communicate to them. Thus some kinds of cakes and pastes are made to eat "*short*," as it is called, or are rendered less tenacious, and a species of brittleness imparted to them by the addition of starch and sugar. In pastry a similar effect and peculiar lightness is produced by butter or lard, while in some articles, white of egg, gum-water, isinglass, and other adhesive substances are added to produce an exceedingly light and porous mass.

The different varieties of bread made in England vary chiefly in their quality, according to the flour of which they are formed. *The best white bread* is made from the purest wheat flour; *ordinary wheaten bread*, of flour to which a little of the finest bran has been added; *seconds*, from flour containing a still larger portion of bran; and common household bread, from flour produced by grinding the whole substance of the grain without any separation of the bran. Symnel bread, manchet or roll bread, and French bread are varieties made of the purest flour, from the finest wheat, a little milk being usually added for rolls, and butter and eggs for choicer purposes. Several other minor kinds of bread are also made, varied by the addition of sundry trifles, as sugar, currants, and other palatable ingredients. The Scotch "short bread" is made from a *very thick dough*, to which butter, sugar, orange-peel, and spices, are added. (See GINGERBREAD.)

In France a number of different kinds of bread are made. The "*pain bis*" is the coarsest sort, and is made of a mixture of groats and wheat flour; the "*pain bis blanc*" is made of a mixture of oatmeal and wheat flour; the "*pain blanc*" of flour from which the finest portion has been sifted; the "*pain mollet*," or soft bread, is made of the purest wheat flour, from the finest grain; the "*pain chaland*," made from the same materials as the last, but the paste is pounded; the "*pain chapalé*" is a small variety of bread, similar to the French or roll bread of England; the "*pain cornu*" is a kind of small bread, named from being done up into four-cornered pieces; the "*pain de la reine*" is another variety of small bread, and the "*pain gruau*" is a bread which has been made of late years in Paris, prepared from the small granular particles separated from the best wheat after a slight grinding. The French have also their soup bread and their country white bread, besides several other varieties, not mentioned in the above list.

In the manufacture of white bread from damaged or inferior flour, a large quantity of alum is employed by the bakers, but with the best flour no alum is required. The utmost beauty, sponginess, and sweetness, may be given to bread without the addition of one particle of alum, provided the best materials are employed. As such is not, however, generally the case, it is a common practice with the bakers to introduce 4 or 5 oz. of alum to every sack of flour, or about 1 oz. to each bushel. The method of detecting this adulteration will be presently explained. The proper quantity of salt to be used is 6 or 7 lbs. to the sack, or 1¼ lbs. to the bushel. 1 sack of the best flour, and 6 lbs. of salt, ought to yield about 360 lbs. of *good bread*, and a sack of seconds 345 to 350 lbs. of bread.

Wheaten bread, made of pure materials, is one of the most wholesome articles of food, and has been justly termed the staff of life. When well fermented and baked, it is very easy of digestion. It should never be eaten till it has stood 24 hours after being taken out of the oven, as newer bread is apt to disagree with the stomach, frequently producing flatulence, heartburn, and indigestion.

Adult. This is often carried to a fearful extent: Mr. Accum says, "The bakers' flour is very often made of the worst kinds of damaged foreign wheat, and other cereal grains mixed with them in grinding the wheat into flour. In this capital, no fewer than six distinct kinds of wheaten flour are brought into the market. They are called fine flour, seconds, middlings, fine middlings, coarse middlings, and twenty-penny flour. Common garden beans and peas are also frequently ground up among the London bread flour.

"The smallest quantity of alum that can be employed with effect to produce a white, light, and porous bread, from an inferior kind of flour, I have my own baker's authority to state, is from 3 to 4 oz. to a sack of flour weighing 240 lbs."

"The following account of making a sack of five bushels of flour into bread, is taken from Dr. P. Markham's 'Considerations on the Ingredients used in the Adulteration of Flour and Bread,' (p. 21:) 5 bushels of flour; 8 oz. of alum; 4 lbs. of salt; ½ gallon of yeast, mixed with about 3 gallons of water.

"Another substance employed by fraudulent

bakers is subcarbonate of ammonia. With this salt they realize the important consideration of producing light and porous bread from spoiled, or, what is technically called, *sour flour*. This salt, which becomes wholly converted into a gaseous substance during the operation of baking, causes the dough to swell up into air bubbles, which carry before them the stiff dough, and thus it renders the dough porous; the salt itself is at the same time totally volatilized during the operation of baking. . . Potatoes are likewise largely, and perhaps constantly, used by fraudulent bakers, as a cheap ingredient, to enhance their profit. . . . There are instances of convictions on record, of bakers having used gypsum, chalk, and pipeclay, in the manufacture of bread."

A gentleman, lately writing from the north of England, says that he found in one sample of flour which he recently examined, upwards of 16 per cent. of gypsum, and in another 12 per cent. of the same earth.

Sometime since it was discovered that some of the bakers in France and Belgium added blue vitriol to their dough to make it take more water. It is said that they dissolved 1 oz. of this sulphate in a quart of water, and added a wine-glassful of this solution to the water necessary to make about 50 4 lb. loaves. To the credit of the English baker, no such poisonous materials have ever been found mixed with his bread. *This fraud* may be discovered by boiling a little of the bread in water, to which 5 or 6 drops of nitric acid have been added, and testing the filtered liquor with prussiate of potash, which will give a brown precipitate if copper be present.

Alum may be detected by boiling the bread in water, and adding a little chloride of barium or lime water, or a little water of ammonia, either of which will produce a white precipitate.

Chalk, whiting, burnt bones, plaster of Paris, and similar substances are easily detected by burning a little of the flour or bread in a clean open vessel, when the amount of ashes left will indicate the quantity of adulteration. The quantity of ashes left by genuine flour is very trifling indeed.

Caution. If you purchase bread from the bakers, by all means buy the *best*. When you make it yourself, however, various additions may be made of a wholesome kind, that will render it cheaper. Thus mashed potatoes, ground bran, potato farina, and several other articles may be added at pleasure. Mixing the flour up with a decoction of bran, pumpkins, Iceland moss, and some other similar substances, has been recommended, and it is said that flour so mixed will yield *one quarter* more bread than when water *alone* is used, and that it will keep good for some time.

BREAD, BEE. This is the matter collected by the bees to form the bottom of the hive; it resembles a mixture of rosin and wax; its fumes are thought to be anti-asthmatic.

BREAD, BRAN. *Prep.* I. Mix with ½ a peck of flour, containing the whole of the bran, a ¼ of a pint of small-beer yeast, and a quart of lukewarm water; stir it well with a wooden spoon until it becomes a thick batter, then put a napkin over the dough, and set it about three feet from the fire, until it rises well. Add, if requisite, a little more warm water, strew over it a tablespoonful of salt, and make the whole into a stiff paste. Put it to the fire, and when it rises, again knead it into the dough. If baked in tins, the loaves will be improved.

II. To every pound of flour add ¼ lb. of bran, and proceed as above.

BREAD, EXTEMPORANEOUS. *Prep.* I. (*Ammoniacal Bread.*) Dissolve 1 oz. of sesquicarbonate of ammonia in water, sufficient to make 7 lbs. of flour into a dough, which must be formed into loaves and baked immediately.

II. Divide the flour (8 lbs.) into two portions; mix up the first with water, holding in solution 2 oz. of bicarbonate of soda, and the second with the other portion, to which 1 oz. of muriatic acid has been added. When each mass of dough has been separately well kneaded to a proper consistence, mix them together (perfectly) as quickly as possible; form the mass into loaves, and bake immediately.

Remarks. This bread is considered very wholesome. It contains no yeast.

BREAD, FRENCH. *Prep.* I. Put 1 pint of milk into 3 quarts of water. In winter let it be scalding hot, but in summer, little more than milk-warm: put in salt sufficient. Take 1½ pints of good ale yeast, free from bitterness, and lay it in 1 gallon of water the night before. Pour off the yeast into the milk and water, and then break in rather more than ¼ lb. of butter. Work it well till it is dissolved; then beat up 2 eggs in a basin, and stir them in. Mix about 1½ pecks of flour with the liquor, and, in winter, make the dough pretty stiff, but more slack in summer; mix it well, and the less it is worked the better. Stir the liquor into flour, as for pie-crust, and after the dough is made cover it with a cloth, and let it lie to rise, while the oven is heating. When the rolls or loaves have lain in a quick oven about a quarter of an hour, turn them on the other side for about a quarter of an hour longer. Then take them out and chip them with a knife, which will make them look spongy, and of a fine yellow, whereas rasping takes off this fine color, and renders their look less inviting.

II. Proceed as for the best bread; use the finest flour, and moisten it with a little milk.

BREAD, FRENCH COUNTRY WHITE This is made without yeast.

BREAD, FRENCH SOUP. This is made by adding 1 lb. or more of salt to each sack, in the place of yeast; and it is baked in thin loaves, so as to be nearly all crust, by which means it becomes more soluble in the hot soup.

BREAD, FROM AMERICAN FLOUR. This flour requires nearly twice as much water to make it into bread, as that made from English wheat, and is therefore much more economical. 14 lbs. of American flour will make 21½ lbs. of bread, but the best sort of English flour produces but 18½ lbs. (Mrs. Rundell.)

BREAD, FROM GRAINS. "Birkenmayer, a brewer of Constance, has succeeded in manufacturing bread from the farinaceous residue of beer. 10 lbs. of this species of paste, 1 lb. of yeast, 5 lbs. of ordinary meal, and a handful of salt, produce 12 lbs. of black bread, both savory and nourishing."

BREAD, (*For one sack.*) Flour 1 sack; salt

4 lbs.; water, sufficient quantity; yeast 4 pints. Dissolve the salt in 3½ gallons of the water, (warm,) then add a little of the flour and the whole of the yeast; make a dough, and keep it in a warm place until it rises, then add more flour and warm water in the same way, and work again; after 3 or 4 hours add the remainder of the flour, and sufficient water to bring the dough to a proper consistence. When the whole mass of dough is in a proper state, it is to be cut into loaves and baked.

Remarks. The bakers employ alum in making their bread, as it not only makes the dough more retentive of moisture, but improves the color of the bread. The proportion is usually 6 or 8 oz. of alum per sack, or even more.

By this process a sack of flour will produce from 345 to 350 lbs. of *well*-baked bread, or if slack-baked, from 370 to 385 lbs. of crambling bread.

BREAD, HICK'S PATENT. This is merely bread made in the common way, but baked in an oven so arranged that the vapors arising during the process may be condensed in a suitable receiver. The condensed liquor is a crude, weak spirit, produced during the fermentation of the bread. The product will not pay the expense and trouble of the collection.

BREAD, HOUSEHOLD. (*Economical Bread.*) *Prep.* I. Remove the flake bran from the flour, and boil 5 lbs. of it in 4 gallons of water, until it is reduced to 3½ gallons; strain. With this liquor knead 56 lbs. of the flour, adding salt and yeast as for other bread. Bake the loaves for 2½ hours. (Rev. Mr. Haggett.)

II. Mix 7 lbs. of flour with 3 lbs. of mealy potatoes, previously well mashed, add 2 or 3 spoonfuls of salt, and make a dough with water; then well work it with 3 or 4 spoonfuls of yeast, and after 4 hours bake it.

BREAD, IMPROVEMENT OF. A ½ oz. of carbonate of magnesia added to the flour, for a 4 lb. loaf, materially improves the quality of the bread, even when made from the worst new seconds flour. (Professor E. Davy.) This addition is perfectly innocent.

BREAD, ICELAND MOSS. This vegetable may be made into bread, either alone, or mixed with flour. It is used, in the first case, in the state of meal, in the same way as flour; in the second case, 7 lbs. of it are directed to be boiled in 12 or 13 gallons of water, and employed to make 70 lbs. of flour into dough, which is then fermented and baked in the usual way. It is said that the above quantity of flour will produce, in this way, 160 lbs. (?) of good household bread, whereas the same flour, treated in the usual way, would not produce more than 80 lbs. A simpler mode of making this bread, is to mix 1 lb. of lichen meal with 3½ to 4 lbs. of flour. The bitterness of the lichen is extracted by soaking it in cold water.

BREAD, LEAVENED. *Prep.* Take about 2 lbs. of dough of the last making, which has been raised by barm; keep it in a wooden vessel, covered well with flour. This will become leaven when sufficiently sour. Work this quantity into a peck of flour with warm water. Cover the dough close with a cloth, or flannel, and keep it in a warm place; further, mix it next morning with 2 or 3 bushels of flour, mixed up with warm water and a little salt. When the dough is thoroughly made, cover it as before. As soon as it rises, well knead it into loaves. Observe in this process, that the more leaven is put to the flour, the lighter the bread will be, and the fresher the leaven, the less sour will it taste.

BREAD, PARIS WHITE. *Prep.* To 80 lbs. of the dough, before the yeast was added, from yesterday's baking, add as much lukewarm water as will make 320 lbs. of flour into a thin dough; as soon as this has risen, 80 lbs. are to be taken out and reserved in a warm place as leaven for the next baking, and 1 lb. of dry yeast, dissolved in warm water, is to be added to the remaining portion, which is immediately made into loaves, and shortly afterwards baked, the loaves being placed in the oven without touching each other, that they may become crusty all round.

BREAD, POTATO. *Prep.* I. To mealy potatoes, well mashed, add an equal quantity of dough, made with flour, then add a proper quantity of yeast, and mix in as much potato farina, or wheat flour, as will suffice to bring it to a proper consistence. Ferment and bake, as usual.

II. Mix equal parts of potato starch and finely-pulped potatoes, and work them into a dough over night, adding the proper quantity of yeast; the next morning work in the same quantity of potato starch, mashed potatoes, and wheat flour, adding as much hot water as may be required; let it stand to rise, then work it well, cut it into loaves, and in 2 hours put them into the oven.

BREAD, SOURNESS IN. (*To rectify.*) When the dough has become sour from the fermentation proceeding too far, or the flour being of inferior quality, the addition of about a ½ oz. of carbonate of magnesia, or a little carbonate of soda, will remove it. When it arises from the sourness of the yeast, this method is especially applicable.

BREAD, STEAM-BAKED, (*à la Vienne.*) It has been known for some time at Vienna, that if the hearth of an oven be cleaned with a moistened wisp of straw, bread baked therein immediately afterwards presents a much better appearance, the crust having a beautiful yellow tint. It was thence inferred that this peculiarity must be attributed to the vapor, which being condensed on the roof of the oven, fell back on the bread. At Paris, in order to secure with certainty so desirable an appearance, the following arrangement is practised:—The hearth of the oven is laid so as to form an inclined plane, with a rise of about 11 inches in 3 feet, and the arched roof is built lower at the end nearest the door, as compared with the farthest extremity. When the oven is charged, the entrance is closed with a wet bundle of straw. By this arrangement the steam is driven down on the bread, and a golden-yellow crust is given to the bread, as if it had been previously covered with the yelk of an egg. (Hbgen Correspondent, Sept. 27. Ann. of Chym. and Prac. Pharm.)

BREAD, TO SWEETEN, (WITHOUT SUGAR.) It is not generally known that pure starch added to flour and made into dough, will be partially converted into a species of sugar during the process of fermentation and baking, and produces sweet wholesome bread. From the experiments of Dr. Colquhoun, it appears that starch arrowroot, farina of potatoes, or similar amylaceous substances, made into a jelly with hot water, may be

employed for this purpose with advantage. It is only necessary to mix the flour up with the jelly, instead of mere water, to add yeast and salt, and to bake in the common way. Dr. Percival has recommended the addition of salep for this purpose. 1 oz. of salep dissolved in 1 quart of water; 2 lbs. of flour; 80 grains of salt, and 2 oz. of yeast, gave 3 lbs. 2 oz. of good bread; but the same weight of materials, without the salep, gave only 2½ lbs. If too much salep be added, however, it will give its flavor to the bread.

BREAD, WHITING'S, (Patent.) This is made by dividing the dough into two portions; to the one a little carbonate of soda is added, to the other, a little dilute muriatic acid; they are both well kneaded separately, then mixed together, formed into loaves, and baked immediately. No yeast is used.

BREATH, FŒTID. Scarcely any thing is more disagreeable or disgusting than a stinking breath. Various means have been proposed to remove this annoyance, depending principally on the administration of aromatics, which by their odor might smother it for a time; but these require continual repetition, and are liable to interfere with the functions of digestion. The real cause of a stinking breath is either a diseased stomach or carious teeth; when the former is the case aperients should be administered; and if these do not succeed, an emetic may be given, followed by a dose of salts, or castor oil occasionally. When rotten teeth are the cause, they should be removed; or, if this be impossible, they should be kept clean. Dirty teeth often cause the breath to smell. The use of the tooth-brush should be a daily habit. Occasionally rinsing out the mouth with a little clean water, to which a few drops of a solution of chloride of lime, or chloride of soda, has been added, is an effective method. The following lozenges have also been recommended:—

Gum catechu 2 oz.; white sugar 4 oz.; orris powder 1 oz.; make them into a paste with mucilage, and add a drop or two of neroli. One or two may be sucked at pleasure.

BREAKFAST POWDER. *Syn.* Rye Coffee. Dillenius's ditto. Hunt's Economical Breakfast Powder. Rye roasted along with a little fat. *Use.* As a substitute for foreign coffee, of which it is one of the cheapest and best.

BREE'S ANTI-ASTHMATIC PLASTER. *Prep.* Simple diachylon 1 oz.; powdered camphor and powdered opium, of each ¼ oz.; sweet oil ½ a teaspoonful. *Proc.* Melt the plaster with the oil, then remove the vessel from the fire, and stir in the powders; spread it on leather before it gets cold. *Remark.* It is better made with only half the above quantity of opium.

BREWING. The art of making beer.

General notice. Before entering on a description of the process of brewing, it will be necessary to notice the apparatus and materials required for its conduct.

The apparatus consists of,

1. *A copper or boiler* capable of holding fully two-thirds of the quantity proposed to be brewed; with a gauge-stick to determine the number of gallons of fluid at any given depth therein. A copper holding about 140 gallons is a convenient size for brewing a quarter of malt.

2. *A mash-tub*, or *tun*, capable of containing rather more than the copper.

3. *One or more tuns, or vessels*, to ferment the beer in.

4. *Three or four shallow coolers* to reduce the wort as rapidly as possible to a proper temperature for fermenting.

5. *One or two copper or wooden bowls*, for bailing, &c.

6. *A thermometer* with a scale reaching from zero to above the boiling point of water.

7. *A suitable number of casks* (clean) to contain the beer.

8. *One or more large funnels, or tunners.*

9. *Two or more clean pails.*

10. *A hand-pump* of a size proportionate to the brewing.

These articles will vary in value from £10 upwards, to many hundreds, according to the extent of the brewing; but the whole of them, necessary for a private family, may be bought for less than the former amount. By proper care they will last for 30 or 40 years, and still be in a useful state. The place where these vessels are kept, and the operations carried on, is called the "*Brewhouse.*"

The materials necessary to brew beer are, *good malt*, *hops*, and *water*, and a little *yeast*.

The *malt* is bruised or crushed in a mill before brewing, that it may be acted on the more readily by the water. It should not be ground too small, as it would then make the wort thick; the crushed malt may advantageously lie for a few days in a cool situation, by which it will attract a considerable quantity of moisture from the air, and consequently its soluble portion will be the more easily dissolved out by the water used in mashing. Pale malt may be used coarser than amber or brown malt. A bushel of malt should make a bushel and a quarter when ground, and a quarter should yield between 9½ and 10 bushels, the quantity slightly varying according to the degree of bruising it has undergone. On the large scale, malt is ground in crushing mills, furnished with iron rollers; and on a small scale, by wooden rollers or small mills worked by hand. For private brewing, the malt is generally bought ready ground, for convenience sake. (See Malt.)

The hops should be those of the previous season, and for general purposes grown in Kent; but for the finer sorts of malt liquor, East Kent hops should be used; and where it is intended to be kept for some long time, those known by the names of *Country's*, *Alton's*, or *Farnham Hops* must be employed. The quantity of hops required to a given measure of malt varies from 2 lbs. to 8 lbs. of the former, to 1 quarter of the latter, according to the nature of the brewing. For good strong beer, 4 lbs. or 4½ lbs. is usually sufficient, but when the liquor is very strong, and it is intended to be highly aromatic, and to be kept for a long period, 1 lb. of hops may be used to every bushel of malt, or 8 lbs. to the quarter. Mild porter has about 3 lbs. to the quarter, and weak common beer has frequently only about ¾ lb. of hops to the bushel of malt. A portion of hops is also frequently added to the finer sort of beer, after it is casked, as we shall presently explain.

The water should be *soft* and *clear*, the *yeast sweet* and *good*, and all the vessels and casks both

sweet and *clean*. If this be not the case, with the latter especially, the best brewing in the world will be useless.

PROCESS OF BREWING. This may be divided into

I. *The mashing*. This operation consists in placing the ground or bruised malt in a large tub or "*tun*," known by the name of the "*mash-tun*," macerating it for some time in hot water, and lastly drawing off the wort from a hole in the bottom, over which a bunch of straw, or a strainer, or false bottom, is placed, to prevent the malt passing out along with the liquor. During the process of mashing, a peculiar principle, called by chemists *diastase*, reacts upon the starch also contained in the malt, and converts it first into a species of gum, called by the French chemists "*dextrine*," and then into a species of sugar resembling that produced by the action of sulphuric acid. The greater the quantity of starch converted into sugar in this way, the stronger and finer will be the wort. It therefore becomes a desideratum with the brewer to mash at a temperature that will most fully promote this object. It has been found that the best temperature for this purpose varies from 157° to 160°, but when more than one liquor is used, the first should be something lower than the former, the next may be between the two, and the third may slightly exceed the latter, or be about 165° or 170°. The action of the first mash is merely to extract the sugar contained in the malt already formed; that of the second to convert the starch into sugar by the action of the diastase; the third to fully complete this object, as well as to carry away the remaining portions of extract.

The mashing is usually performed by filling the copper with water, and as soon as it acquires the temperature of 145° in summer, or 167° in winter, 45 gallons are run off into the mash-tun, and 1 quarter of crushed malt gradually thrown in and well mixed by laborious working, until it becomes thoroughly incorporated and no lumps remain; the agitation is then continued for 30 or 40 minutes, when 36 gallons of water from the boiler, at a temperature of 200°, are added, and the whole again well agitated until thoroughly mixed. The mash-tun is now closely covered up, and allowed to stand for an hour or an hour and a half. At the end of this time the tap is set, and the wort is drawn off into the "underback," and generally amounts to about 50 to 52 gallons: 60 gallons of water, at a temperature of 200°, are next added to the mash-tun, previously drained well, and after being well worked, the whole is covered up as before. This mash is allowed to remain for an hour, when it is drawn off, and the malt again drained ready for the third mash. This time only 35 gallons of water are added at 200°, and allowed to stand for ½ an hour, when it is run off in the same manner as before, and the malt allowed to drain. The worts are now ready for boiling.

In some cases only the first and second mash is used for strong beer, and the third kept for table, or as water to mash a fresh quantity of malt with. In Scotland (see SCOTCH ALE) the brewer only mashes *once*, and afterwards washes his malt by frequent showers or "sparges" of water, by which he gets a wort of greater strength in proportion to its quantity. In operating as above, the average or mean temperature of the first mash is 145°, of the second 170°, and of the third 180°. In winter the mean temperature may be reckoned as 6 or 7° lower. A quarter of malt in this way will produce a wort having a specific gravity by the saccharometer of 1·234, or equal to 84 lbs. of extract. (See SACCHAROMETER.)

It is calculated that 32 gallons of the water employed in the mashing remain in the grains after the wort is drawn off.

II. *Boiling*. The wort is next transferred to the copper, and heated to the boiling point as soon as possible. In large breweries where several coppers are employed, the first mash is no sooner run into the underback, than it is transferred to the wort copper, and immediately boiled, and the successive mashings added as soon as drawn off; but in private houses, where there is only one copper, the boiling cannot be commenced until the water for the last mashing is removed. In some cases the worts are brewed separately, thus producing 2 or 3 qualities of beer, viz. *strong ale or stout, beer, and table beer*. No sooner has the boiling commenced than the hops may be added, and the boiling continued for 2 or 3 hours or more. In some breweries the beer is boiled for several hours, and in Belgium it is said that this is even continued for 10 or 12 hours, but too much boiling drives off the flavor of the hops. In general, two hours good boiling will be found sufficient. In small brewings the first wort should be sharply boiled for 1 hour, and the second for 2 hours. But if intended for beer of long keeping, the time should be extended half an hour. The hops should be strained from each preceding wort, and returned into the copper with the succeeding one. Between the boilings the fire should be damped with wet cinders, and the copper door set open.

For small-beer only half an hour is necessary for the first wort, 1 hour for the second, and 2 hours for the third.

It is reckoned that $\frac{1}{8}$ to $\frac{1}{15}$ part of the wort is dissipated in steam during the process of boiling, but this must of course depend altogether on the evaporative power of the boiler and the length of time the boiling is continued.

III. *Cooling*. The boiling being finished, the wort is run off from the copper into the hopback, which is furnished with a strainer to keep back the hops. It is then pumped into large square shallow vessels called "*coolers*," where it is exposed to a good current of air to cool it down to a proper fermenting temperature as quickly as possible. This is of the utmost importance for the success of the brewing. The wort should be laid so shallow as to cool within 6 or 7 hours to the temperature of about 60°. In warm weather, the depth should not exceed 3 or 4 inches; but in cold weather it may be 5 or 6 inches. As soon as the heat has fallen to about 60°, it should be instantly tunned and yeasted.

It is reckoned that by the joint evaporation from the boilers and coolers, there is a loss of about 40 gallons per quarter.

In private families a good way is to bring the wort from the copper in pails, and to pour it into a basket or a hamper, set over the coolers, by which means the hops will be retained, and the beer run through clear.

IV. *Fermentation.* When the wort is sufficiently cool, it is run into the fermenting tuns or vessels, which in small brewings may be casks, with one of their heads removed. These are called "*gyle tuns,*" and should not be more than ⅔ full. The yeast, previously mixed with a little wort, and kept until this latter has begun to ferment, may now be added, and the whole agitated well; the tun should then be covered up, until the fermentation is well established. During this process the temperature rises from 9° to 15°.

The quantity of yeast employed, and the temperature of the wort when it is added, differ in different breweries and for different kinds of beer. From ½ to 1⅜ of yeast, taken from a previous brewing of the same kind of beer, is the quantity usually employed. The higher the temperature the less yeast necessary. In England, the temperature at which the yeast is usually added, varies from 55° to 65° Fahr. In cold weather, the heats in the coolers should be 5° or 6° higher than in mild and warm weather. For ale, in cold weather, it should be tunned as soon as it has fallen to 60° in the coolers. For porter, to 64°, and for table beer to 70°; and in warm weather, strong beer should be 4° or 5° less, and table beer 7° or 8°. Care should be also taken that the worts do not get cold before the yeast is mixed to produce fermentation. The common rule for mixing the yeast is 1½ lbs. to every barrel of strong beer wort, and 1 lb. to every barrel of table beer wort.

The commencement of the fermentation is indicated by a line of small bubbles round the sides of the tun, which, in a short time, extends over the surface. A crusty head follows, and then a fine rocky one, followed by a light frothy head. In the last stage, the head assumes a yeasty appearance, and the color is yellow or brown, the smell of the tun becoming strongly vinous. As soon as this head begins to fall, the tun should be skimmed, and the skimming continued every two hours till no more yeast appears; this closes the operation, and the beer should then be put into casks, or, in technical language, "*cleansed.*" A minute attention to every stage of this process is necessary to secure a fine flavor and a brilliant beverage.

In Scotland the temperature at which the yeast is added, is generally much lower than in England; for ale, it is from 51° to 52°, and the whole process is conducted in the cooler part of the year, so that the temperature seldom rises higher than 65° or 66°. The Bavarian beer, so much celebrated on the continent, as well as the finest kinds of East India ale, are fermented at very low temperatures.

It may be generally regarded as a rule, that the lower the temperature, and the slower, more regular and less interrupted the process of fermentation, the better will be the product and the less likely to change by age. More yeast is required in winter than in summer. Should the fermentation become slack in the gyle-tun, a little more yeast is frequently added, and the whole is roused up; but on the contrary, should the temperature rise considerably, or the fermentation become too active, the wort should be cooled a little and skimmed, or at once cleansed.

V. *Cleansing.* When the fermentation has proceeded to a certain extent, the liquor undergoes the operation called "cleansing." This consists in drawing it off from the gyle tun into other vessels, or casks, set sloping, so that the yeast, as it forms, may work off the one side of the top, and fall into the vessel placed below to receive it. In small brewings, the beer is often at once transferred from the gyle tun to the store casks, which are sloped a little until the fermentation is over, when they are skimmed, filled, and bunged up. When the operation of cleansing is not employed, the yeast is removed from the surface of the gyle tun with a skimmer, and the clear liquor drawn off into the store casks.

The process of cleansing should always commence as soon as the gravity of the liquor falls to 10 or 11 lbs. per barrel, which it usually does in about 48 hours, provided the fermentation has been well conducted. Some brewers add ¼ to ½ lb. of wheat or bean flour to the beer in the gyle-tun, shortly before cleansing, to quicken the discharge of yeast, but it is not clearly ascertained whether such a plan be advantageous or the contrary.

VI. *Storing.* As soon as the fermentation is concluded, which generally takes from 6 to 8 days, or more, the clear liquor is drawn off into the store casks, or vats, which are then closely bunged down, and deposited in a cool cellar.

VII. *Ripening.* After a period, varying from 1 to 12 months, or more, according to the nature of the brewing, the liquor will have become fine, and sufficiently ripe for use. All the attention required during this interval, is to look occasionally to see that there is no leakage, and to open the vent holes, should any oozings appear between the staves of the casks.

VIII. *Fining.* It frequently happens that malt liquor, especially porter, with all the care bestowed upon it in brewing, will not turn out sufficiently fine to meet the taste and eye of the consumer, in which case it is usually subjected to the operation of "*clarifying.*" For this purpose 1 oz. of isinglass is put into 1 quart of weak vinegar, or still better, hard beer, and when dissolved, a sufficient quantity of good beer may be added to make it measure 1 gallon. This mixture is called "finings;" 1 to 2 pints of which is the proper quantity for a barrel. The method of using it, is to put the finings into a bucket, and to gradually add some of the beer, until the bucket is three parts full, during which time it is violently agitated with a whisk, and this is continued until a good frothy head is raised upon it, when it is thrown into the barrel of beer, and the whole well rummaged up, by means of a large stick shoved in at the bunghole. In a few days the beer will usually become fine.

In some bad sorts of beer isinglass will have no effect. This may be ascertained beforehand, by trying some in a long glass tube, or vial, with a little of the finings. These should be well shaken together, and then set aside for a short time, when it will be found that the finings will rise to the top, leaving the central portion of the beer clear, if it be in a proper condition for clarifying; but if, on the contrary, they sink to the bottom, and the liquor still keeps foul, no quantity of finings, how-

ever great, will ever clarify it. This latter defect may be remedied by proceeding to fine it after the manner above described, and then adding, *after* the finings have been well rummaged up, either 1 spoonful of oil of vitriol, or gum catechu, dissolved in ½ a pint of warm water, again rummaging well for a quarter of an hour. Or 1 or 2 oz. of tincture of catechu may be used instead, mixed with a little water. Either of these additions acts chemically on the finings, in the same way as good beer does, precipitating them along with the foulness, and thus brightening the liquor. The addition of a handful of hops, previously boiled for 5 minutes in a little of the beer, and then added to the barrel, and the whole allowed to stand for a few days, before proceeding to clarify it, will generally have the same effect.

CONCLUDING REMARKS. *The nature and varieties of beer, &c.* The numerous varieties of beer met with in commerce, arise either from a difference in the materials, or the management of the brewing. Thus the *water*, but more generally the nature of the malt, or the temperature of the mashing or the fermentation, decides the character of the liquor. The difference between ale and porter arises from the color of the malt, and the distinctions between the same class of liquor, brewed from similar materials, may be referred to the mashing or the fermentation. Scotch ale and Bavarian beer differ in style from other ales, as before explained, from being fermented at lower temperatures; and porter differs from either of these, because it has been made with higher dried malt. This is the cause of the almost endless varieties of malt liquor met with in England. Every country—nay, every town and every brewer, is distinguished by the production of a different flavored beer. Besides the varieties arising from difference of quality or manipulation in the brewing of similar kinds of liquor, there are certain leading features which distinguish some of them, which has led them to be considered in the light of distinct members of the same family. These are *ale*, *beer*, and *porter*. *Ale* is a pale liquor, brewed from lightly-dried malt, and is usually met with, abounding in undecomposed saccharine matter and mucilage; *beer* is a fine, strong, well-fermented liquor, darker, less saccharine, and more alcoholic than ale. The finer class of Scotch, Bavarian, and East India ales, properly belong to this class; *porter* is a dark brown colored liquor, originally prepared from high-dried malt, but now generally made from pale malt, and colored and flavored by patent or burnt malt. *Small or table beer* is a weak liquor, containing 3 or 4 times the quantity of water that is used for ordinary beer. *Stout, brown stout, &c.* are varieties of porter, differing only in their strength. See ALE, BEER, and PORTER, in their alphabetical order.

Qualities. The characteristics of good beer are transparency and a fine color, to whatever variety it may belong; and if it has been properly brewed, this will usually be the case. Hence color and transparency become a proof of good beer. Good beer is pleasant, wholesome, and nutritious, at the same time that it is strengthening and exhilarating.

Season for brewing. The best times of year for brewing are the spring and autumn, as at those periods the temperature of the air is such as to permit the cooling of the worts sufficiently low, without having recourse to artificial refrigeration, or the use of machinery for that purpose.

Adulteration. Laws respecting brewing, &c. By the laws of England, which have existed, with slight modifications, ever since the days of Queen Anne, *nothing* is allowed to enter into the composition of beer but malt and hops. The cupidity of the fraudulent brewer has, however, frequently induced him to introduce other ingredients with the view of imparting a false strength to his liquor, or as a substitute for one or other of its constituents. Thus, *to impart bitterness*, and to lessen the quantity of hops required for the beer, *quassia, gentian, wormwood*, and *broom-tops* have been used; *to give pungency and flavor, capsicum, and grains of paradise*, (in concentrated tinctures,) *ginger, corianders, orange-peel, and caraways;* to give *intoxicating properties—opium, cocculus indicus, nux vomica, tobacco, extract of poppies and tincture of henbane;* as a *substitute for malt—molasses, coloring and sugar;* to impart a *false appearance of age—sulphuric acid, alum, green vitriol*, and *common salt*. The following is a list of the unlawful substances seized at different breweries, and brewers' druggists' laboratories in London, as copied from the minutes of the committee of the House of Commons. "*Cocculus indicus, multum, (an extract of the cocculus,) coloring, honey, hartshorn shavings, Spanish juice, orange powder, ginger, grains of paradise, quassia, liquorice, caraway seeds, copperas, capsicum, mixed drugs.*"

Sugar and coriander seeds may be mentioned as a very common addition to beer. It is said that 6 lbs. of the former, and 1 lb. of the latter, are equal in strength and intoxicating quality to a bushel of malt. The sugar is employed in a roasted state, for the sake of its color; even coffee has been used for this purpose. *Publicans* generally reduce their strong beer with water, or table beer, and add treacle, (which they call "*foots*,") and a mixture of copperas, salt, and alum, (which they call "*heading*,") to make it bear a frothy head, and in many cases, gentian, sugar, or other similar ingredients, are added to keep up an appearance of strength, and to impart a flavor.

The "*cheap beer*" sold by some taverns in London, is made by dividing the contents of *two* butts among *three* butts, filling them up with water, and adding a bladder of *porter extract* (technically termed P. E.) to each.

The desire of evading the duty on malt, led to the discovery of its being only necessary to malt ⅓ or less of the grain, this portion being sufficient to convert the starch of the other part into sugar, in the process of mashing. This plan answers well when the wort is merely intended for the production of "*grain spirit*," but beer so made is inferior in quality to that brewed wholly from malt. Inferior kinds of beer have also been made from other ingredients than barley malt; thus, the grain of other cereals may be used for this purpose, as wheat, oats, &c., and many other vegetable substances that contain starch and sugar. *Potatoes, turnips, beet root, carrots, parsnips*, and other similar roots and seeds, will all produce beer by peculiar management, but the liquor must be con-

fined to private consumption, as the law does not permit its sale. Some of the above articles produce very wholesome beer, if mashed with about $\frac{1}{10}$ or $\frac{1}{12}$ of their weight of good barley malt.

The densities of the worts employed for different kinds of beer vary considerably, as will be seen by the following table.

TABLE exhibiting the densities of different kinds of Beer.

Description.	Pounds per Barrel.	Specific Gravity.
Burton Ale, 1st Class	40 to 43	1·111 to 1·120
Do. 2d "	35 to 40	1·097 to 1·111
Do. 3d "	28 to 33	1·077 to 1·092
Ordinary Ale . . .	25 to 27	1·070 to 1·073
Common Ale . . .	21	1·058
Scotch Ale, 1st Class	40 to 44	1·111 to 1·122
Do. 2d "	33 to 40	1·092 to 1·111
Porter (ordinary) . .	18	1·050
Do. (good) . . .	18 to 21	1·050 to 1·058
Do. (double) . . .	20 to 23	1·055 to 1·060
Brown Stout . . .	23	1·064
Do. (best) . .	26	1·072
Table Beer	12 to 14	1·033 to 1·039
Table Beer (common)	6	1·014

BREWING UTENSILS, TO CLEAN AND PRESERVE. In cleaning them before being put away, avoid the use of soap, or any greasy material, and use only a brush and scalding water, being particularly careful not to leave any yeast or fur on the sides, then place them away in a clean, and moderately dry situation. Should they become tainted or mouldy, take a strong lye of pearlash, which spread over the bottoms of the vessels scalding hot, and then with the broom scrub the sides and other parts.

Or, take common salt and spread it over the coolers, &c., and strew some on their wet sides, turn in scalding water and scrub them with a broom.

Or, throw some quicklime into water in the vessel, and scrub over the bottom and sides with it; in each case well washing afterwards with clean water.

Or, wash well first with oil of vitriol diluted with 8 times its weight of water, and afterwards with clean water.

Remarks. Brewing utensils with care will last for many years. Mr. Cobbett says: "I am now in a farm-house, where the *same* utensils have been used for *forty years;* and the owner tells me that they may last for *forty years longer.*"

BRINE, RED CABBAGE. *Prep.* Steep red cabbage leaves in a strong solution of salt. *Use.* As a test for acids and alkalis.

BRINE, VIOLET. *Prep.* The same as the above, but made from the petals of the blue violet.

BRIOCHE PASTE, (IN COOKERY.) *Prep., &c.* A paste made of eggs and flour, fermented with a ttle yeast, to which a little salt, a large quantity of sugar, and half as much butter as the weight of the flour used, are afterwards added and well worked in. *Use.* As an addition to soup, a casing for lobsters, patties, eggs, &c.

BRITANNIA METAL. *Syn.* TUTANIA. A fine species of pewter.

Prep. Melt together equal parts of plate brass, bismuth, antimony, and tin, and add the mixture at discretion to melted tin, until it acquires the proper degree of color and hardness.

II. To the last add an equal part, or $\frac{1}{2}$ of its weight of metallic arsenic. To be used as *before.*

III. Melt together 1 part of antimony, 4 parts of brass, and 5 or more parts of tin. This may be used at once, as Britannia metal. (See PEWTER.)

BRITISH GUM. When starch is exposed to a temperature of 300°, (Ure,) 600°, (Brande,) it becomes brown, soluble in cold water, and ceases to strike a blue color with iodine. It is largely employed by the calico printers, as a substitute for gum.

BRISTLES AND HORSE HAIR, TO DYE. These readily take any of the usual dyes applied to cotton or wool.

BROMAL. A compound discovered by Löwig, produced by the action of bromine on alcohol, hence the name, from the first portion of the name of each constituent. (See CHLORAL.)

BROMATES. Compounds of the bases with bromic acid, which see. *Char., Tests, &c.* When heated they evolve oxygen, and become bromides; with nitrate of silver and the proto-salts of mercury, they give white precipitates; that with the former is insoluble in nitric acid, but very soluble in ammonia. If a few drops of muriatic acid be added to a bromate, and it be then shaken with a little ether in a glass tube, a solution of bromine is obtained.

BROMBENZOIC ACID. A new acid, discovered by Peligot, and prepared by exposing benzoate of silver to the vapors of bromine, until they cease to be absorbed, when the acid is dissolved out with ether and obtained by evaporation.

BROMIC ACID. An acid composed of oxygen and brome.

Prep. Add sulphuric acid to a solution of bromate of baryta, until all the earth be thrown down, particularly avoiding an excess of acid; then concentrate the liquor by heat, until it be of the consistence of a sirup.

Prop. If the evaporation be carried too far, the acid will be decomposed. This acid forms salts with the bases, called bromates, which are very similar to the chlorates and iodates. *Bromate of potassa* may be made by agitating bromine with a concentrated solution of caustic potassa, collecting the crystalline white powder that falls down, and purifying it by solution in boiling water, and crystallization. *Bromate of silver* is formed by adding a solution of bromate of potassa to another of nitrate of silver.

BROMIDE. A compound form of a base and bromine. (See BROMINE.)

Char. and Tests. The soluble bromides give white precipitates with nitrate of silver, acetate of lead, and protonitrate of mercury. That from the first of these is insoluble in ammonia water, unless concentrated. A few drops of liquid chlorine poured upon a bromide, and the mixture agitated with a little sulphuric ether, yields an ethereal solution of bromine.

BROMIDE OF AMMONIA, may be formed by the mixture of ammoniacal and hydrobromic acid gases, or liquid hydrobromic acid and liquor of ammonia, or by putting bromine into water of ammonia.

Prep. This salt may be obtained by evaporation

in the form of solid white prismatic crystals. It is volatile and easily decomposed.

BROMIDE OF CARBON. (Discovered by M. Serullas.) *Prep.* Brome 2 parts; periodide of carbon 1 part, mix; just enough solution of potassa is added to make the liberated iodine disappear. The liquid bromide of carbon, which collects at the bottom of the solution, is then separated from the supernatant portion, and allowed to stand until it becomes clear. A few crystals of iodide of potassium rise to the surface, and may be removed. The clear liquid is then put into a little water slightly alkalized with potassa, to remove a little remaining iodide of carbon, after which it is quite pure.

BROMIDE OF IODINE. Bromine and iodine unite rapidly by mere mixture. By careful distillation a red vapor is obtained, which, on cooling, condenses into red crystals, of a form resembling fern leaves. This is said to be the *protobromide*. By adding more bromine, these crystals are converted into a fluid, said to be the *bibromide*.

BROMIDE OF SULPHUR. This is made by dissolving sublimed sulphur in bromine; it is a reddish, oily-looking fluid, easily decomposed, especially by water.

BROMINE. *Syn.* Brome. An elementary substance, discovered by M. Balard, of Montpellier, in 1826.

Prep. A current of chlorine is passed through the uncrystallizable residuum of sea-water, called *bittern*, which then assumes an orange tint, in consequence of bromine being set free from its combinations; sulphuric ether is then agitated with it, and the mixture is allowed to stand until the ethereal portion, holding the bromine in solution, floats upon the surface. This is then carefully decanted, and agitated with a solution of potassa, by which means bromide of potassium and bromate of potash are formed.

The whole is next evaporated to dryness, and submitted to a dull red heat; the residuum is then powdered, mixed with pure peroxide of manganese, and placed in a retort; sulphuric acid, diluted with half its weight of water, is now poured in. Red vapors immediately arise, and condense into drops of bromine, and are collected by plunging the neck of the retort to the bottom of a small receiver, containing cold water. The bromine forms a stratum beneath the water, and may be collected and further purified, by distillation from dry chloride of calcium.

Prop., Use, &c. A dark, reddish-colored liquid, having an odor resembling chlorine. It freezes at —4°, boils at 116·5°, is about 3 times as heavy as water, is very soluble in ether, less so in alcohol, and only slightly so in water. With hydrogen it forms hydrobromic acid, and with the bases, compounds called bromides, or hydrobromates. It possesses similar medicinal properties to iodine, and has been administered in goitre, scrofula, &c., in the form of an aqueous solution, composed of 1 part of bromine to 4 of water; 5 or 6 drops being the dose. This solution has also been used as a lotion.

Tests and Antidotes. The solution of chloride of gold gives a red tinge with hydrobromic acid, or an electro-positive hydrobromate.

When bromine exists in an organic mixture, caustic potassa should be added to the mass, which should then be reduced to an ash, exhausted by distilled water, and chlorine passed through the solution, or the chloride of gold added to it, previously carefully neutralized by hydrochloric acid. When chlorine is used, starch may render the presence of the element more perceptible. Nitrate of silver is also a delicate test, where the bromine is not mixed with chlorine; the bromide of silver is distinguished from the chloride by heating with hydrochloric acid and chlorite of lime, when ruddy fumes are evolved, if bromine is present.

M. Barthez has proposed magnesia as an antidote for bromine. From several experiments, it appears that the bromide of magnesium is by no means an active salt; neither is it inert. From experiments performed on rabbits, I conclude starch in solution, and white of egg, to be excellent antidotes to the poison. (Dr. Glover, Med. and Sur. Jour., No. 152.)

BROMINE, CHLORIDE OF. *Prep.* Transmit a current of dry chlorine through brome, and condense the disengaged vapors in a receiver surrounded with ice. *Prop.* A volatile reddish fluid, soluble in water, without decomposition.

BRONCHITIS. An inflammation of the mucous lining of the bronchia, or smaller ramifications of the windpipe. In its milder form it is commonly called "*a cold on the chest.*"

Symp. Hoarseness, dry cough, a slight degree of fever, followed by expectoration of mucus, at first thin, and afterwards thick and copious. In the severer forms, there is more fever, cough, and oppression at the chest, &c.

Treat. The generality of cases of bronchitis yield to small and repeated doses of ipecacuanha, and antimonial diaphoretics, at the same time adopting a light diet, and keeping the bowels open with mild purgatives.

BRONZE. A metallic alloy, composed principally of tin and copper, remarkable for the exactness of the impressions which it takes by moulding, as well as its durability; and hence, extensively employed in the casting of busts, medals, and statues. Bell, cannon, and speculum metal are varieties of bronze. In ancient times, when the manufacture of steel was ill-understood, cutting instruments were frequently made of this alloy. For statuary work, the great desideratum is to obtain an alloy capable of flowing freely into the most minute outlines of the mould, hard, and yet tough, and capable of resisting the corroding action of the weather. It must also acquire that peculiar antique green appearance, that is so much admired in bronzes.

When only a small quantity of the alloy is required, it is prepared in crucibles, but for statues or larger works, on reverberatory hearths. The fusion of the mixed metals must be conducted under pounded charcoal, and as rapidly as possible. When melted, it must be frequently stirred together to produce a perfect mixture, before casting. Coal is the fuel principally employed for the furnaces.

The proportions of the materials so vary in different castings, that it is almost impossible to say precisely what quantities are the best. The following may be regarded as good specimens. (See also Cannon, Bell, and Speculum Metal.)

BRONZE, (FOR STATUARY.) I. Copper 88 parts; tin 9 parts; zinc 2 parts; lead 1 part.

II. Copper 82½ parts; tin 5 parts; zinc 10½ parts; lead 2 parts. These are very nearly the proportions in the celebrated statue of Louis XV.

III. Copper 90 parts; tin 9 parts; lead 1 part.

IV. Copper 91 parts; tin 9 parts.

BRONZE, (FOR MEDALS.) I. Copper 89 parts; tin 8 parts; zinc 3 parts. *Remarks.* This metal assumes a beautiful antique appearance by age, and takes a good impression by stamping.

II. Copper 95 parts; tin 4 or 5 parts. These are the proportions recommended by M. Chaudet, who casts it in moulds made of bone-ash, like cupels, and afterwards finishes and polishes the medals in a coining press. This is also excellent for any small castings.

BRONZE, (FOR CUTTING INSTRUMENTS.) Copper 100 parts; tin 14 parts.

Remarks. M. Dussaussy says that the above alloy, when hardened and tempered after the manner of the ancients, will yield an edge nearly equal to that of steel. Several analyses have been made of ancient cutting instruments, whence it appears that the proportion of tin varies from 4 to 15 per cent., which tends to prove that more depends on the exact mode of tempering the alloy, than on the relative quantities of the ingredients. Zinc and tin are inadmissible in bronze for this purpose. One or 2 per cent. of iron might, nevertheless, be added with advantage. The ancient bronze used for springs, contained only 3 to 4 per cent. of tin.

BRONZE, (FOR MORTARS.) Copper 93 parts; lead 5 parts; tin 2 parts.

Remarks. The edges and lips of mortars must be tempered by heating them to a cherry red, and then plunging them into cold water; as unless so treated, they are very apt to be broken.

BRONZE, (FOR ORNAMENTAL WORK, TO BE GILDED.) I. Copper 82 parts; zinc 18 parts; tin 3 parts; lead 2 parts.

II. Copper 83 parts; zinc 17 parts; tin 1 part; lead ½ part.

BRONZE POWDERS. I. (*Beautiful red.*) *Prep.* Mix together sulphate of copper 100 parts; carbonate of soda 60 parts; apply heat until they unite into a mass, then cool, powder, and add copper filings 15 parts; well mix, and keep them at a white heat for twenty minutes, then cool, powder, and wash and dry.

II. (*Gold colored.*) *Prep. a.* Verdigris 8 oz.; tutty powder 4 oz.; borax and nitre, of each 2 oz.; bichloride of mercury ¼ oz.; make them into a paste with oil, and fuse them together. *Used* in japanning as a gold color.

b. Dutch leaf reduced to an impalpable powder by grinding.

III. (*Iron colored.*) Plumbago finely powdered.

IV. (*Silver white.*) *Prep.* Melt together 1 oz. each of bismuth and tin, then add 1 oz. of running quicksilver; cool and powder.

BRONZING OF MEDALS, AND ORNAMENTS OF COPPER, ELECTROTYPES, &c. *Proc.* I. Having thoroughly cleaned and polished the surface of the specimen, with a brush apply the common crocus powder, previously made into a paste with water. When dry, place it in an iron ladle, or on a common fire-shovel, over a clear fire for about 1 minute; and when sufficiently cool, polish with a plate-brush. By this process a bronze similar to that on tea-urns is produced; the shade depending upon the duration of the exposure to the fire. (Chemist, iii. 49.)

II. By substituting finely-powdered plumbago for crocus powder in the above process, a beautiful, deep, and permanent bronze appearance is produced.

III. Rub the medal with a solution of livers of sulphur, or sulphuret of potassium, then dry. This produces the appearance of *antique* bronze very exactly.

IV. Dissolve 2 oz. of verdigris and 1 oz. of sal ammoniac in 1 pint of vinegar, and dilute the mixture with water until it tastes but slightly metallic, when it must be boiled for a few minutes, and filtered for use. Copper medals, &c., previously thoroughly cleaned from grease and dirt, are to be steeped in the liquor at the boiling point, until the desired effect is produced. Care must be taken not to keep them in the solution too long. When taken out, they should be carefully washed in hot water, and well dried. *Gives an antique appearance.*

V. (*Chinese method.*) Make a paste with 2 oz. each of verdigris and vermilion; 5 oz. each of alum and sal ammoniac, all in fine powder, and vinegar q. s.; then spread it over the surface of the copper, previously well cleaned and brightened, uniformly warm the article by the fire, and afterwards well wash and dry it, when, if the tint be not deep enough, the process may be repeated. The addition of a little blue vitriol inclines the color to a chesnut brown, and a little borax to a yellowish brown. Much employed by the Chinese for copper tea-urns.

VI. Dissolve 1 oz. of sal ammoniac, 3 oz. cream of tartar, and 6 oz. of common salt, in 1 pint of hot water; then add 2 oz. of nitrate of copper, dissolved in ½ a pint of water; mix well, and apply it repeatedly to the article, placed in a damp situation, by means of a brush moistened therewith. *Effect.* Very antique.

VII. Salt of sorrel ¼ oz.; sal ammoniac 1 oz.; distilled vinegar 2½ pints; dissolve. As last.

BRONZING, SURFACE. This term is applied to the process of imparting to the surfaces of figures of wood, plaster of Paris, &c., a metallic appearance. This is done by first giving them a coat of oil or size varnish, and when this is nearly dry, applying with a dabber of cotton or a camel-hair pencil, any of the metallic bronze powders; or the powder may be placed in a little bag of muslin, and dusted over the surface, and afterwards finished off with a wad of linen. The surface must be afterwards varnished.

Paper is bronzed by mixing the powders up with a little gum and water, and afterwards burnishing.

Iron castings may be bronzed by thorough cleaning, and subsequent immersion in a solution of sulphate of copper, when they acquire a coat of the latter metal. They must be then washed in water.

BROOM ASHES. *Prep.* Burn broom stalks and collect the ashes. Sometimes used as a diuretic in dropsy.

BROOM COFFEE. Broom seeds, roasted

with a little butter and then ground. *Use.* As a substitute for coffee.

BROOM, SALT OF. Obtained by dissolving broom ashes in water, filtering and evaporating. *Remarks.* Antacid, consists principally of carbonate of potassa. Sometimes used in dropsy.

BROTH, (IN COOKERY.) The liquor in which meat is boiled; it is distinguished from soup by its inferior strength and quantity of seasoning, &c. The general method of preparing broth is similar to that of soup, to which article the reader is referred.

BROWN DYE. The different shades of this dye vary from pale yellow and reddish brown, up to very dark brown, almost black, every shade of which, however, may be produced as the taste of the workman may dictate, by mixtures of reds and yellows with blues and blacks, or by simple dyes, which at once impart a brown,—as catechu, walnut rinds, or oxide of manganese.

I. (*For Wool.*) *α.* Boil the cloth in a mordant of alum, and common salt dissolved in water, then dye it in a bath of logwood, to which a little green copperas has been added. The proportion of alum should be 2 oz., and of salt 1 oz., to every pound of cloth.

β. Boil the goods in a mordant of alum and sulphate of iron, then wince them through a bath of madder. *Remarks.* The tint depends on the relative proportions of the alum and copperas; the more of the latter, the darker will be the dye. The joint weight of the two should not exceed ⅛ of the weight of the wool. The best proportions are 2 parts of alum and 3 of copperas.

γ. Give the wool a mordant of alum and tartar, then pass it through a madder bath, which will dye it red. It must now be run through a black bath of galls and sumach, or logwood, to which a little acetate or sulphate of iron has been added.

δ. Proceed to mordant the cloth as last, and dye in a madder bath, then remove it and add a little acetate or sulphate of iron, and again pass it through the bath, until the required tint is produced.

ε. Give the cloth a light blue ground with indigo, then give it a mordant with alum, wash in water, and run it through a bath of madder.

ζ. Give the cloth a mordant of alum and tartar, then pass it through a madder bath, and afterwards through a bath of weld or fustic, to which a little iron liquor has been previously added. In this way every shade from mordoré and cinnamon to dark chesnut may be dyed.

η. Boil 1 lb. of fustic chips for 2 hours, and pass the cloth through the bath for 1 hour, take it out and drain, then add 1¼ oz. of green copperas, and ½ lb. of good madder, and pass the cloth again through the bath, until the proper tint is produced. This makes bronze browns, but by varying the proportion of the mordant, other shades may be produced.

II. (*For Silk.*) *α.* Give the silk a mordant as before described, then dye in a bath made by mixing the equal parts of decoction of logwood, fustic, and Brazil wood. The shade may be varied by mixing the decoctions in different proportions. *Brazil wood reddening, logwood darkening,* and *fustic yellowing,* the tint.

β. Dissolve 4 oz. of annotto and 1 lb. of pearl-ash in boiling water, and pass the silk through it for 2 hours, then take it out, squeeze it well and dry; next give it a mordant of alum, and pass it *first* through a bath of Brazil wood, and afterwards through a bath of logwood, to which a little green copperas has been added; wring it out and dry; afterwards rinse well.

III. (*For Cotton and Linen.*) *α.* Give the pieces a mixed mordant of acetate of alumina and acetate of iron, and then dye them in a bath of madder, or madder and fustic. When the acetate of alumina predominates, the dye has an amaranth tint. The iron darkens it.

β. First gall the goods, then turn them for a short time through a black bath, next give them a mordant of sulphate of copper, and pass them through a decoction of fustic, afterwards through a bath of madder, and again through the solution of sulphate of copper; drain, dry, and rinse well, then finish with a boil in soap and water. This gives a chesnut brown.

γ. First give a mordant of alum, then pass the goods through a madder bath, and next through a bath of fustic, to which a little green copperas has been added. This gives a cinnamon brown.

Remarks. Browns may be also dyed at once, by what are called substantive or direct dyes; thus—

I. *Decoction of oak bark* dyes wool a fast brown of various shades, according to the quantity employed. If the cloth be first passed through a mordant of alum, the color is brightened.

II. *Infusion or decoction of walnut peels* dyes wool and silk a brown, which, like the preceding, is brightened by alum. The older the liquor the better.

III. *Horse-chesnut peels* also give a brown. A mordant of muriate of tin turns it on the bronze, and sugar of lead the reddish brown.

IV. *Catechu, or terra japonica,* gives cotton a brown dye; blue vitriol turns it on the bronze, and green copperas darkens it, when applied as a mordant, and the stuff dyed in the bath boiling hot. Acetate of alumina as a mordant brightens it. The French color, called "carmelite," is given with 1 lb. of catechu, 4 oz. of verdigris, and 5 oz. of sal ammoniac.

V. *Sulphate or muriate of manganese,* dissolved in water with a little tartaric acid, gives the bronze tint called "solitaire." The stuff, after being passed through the solution, must be turned through a weak lye of potash, and afterwards through another of chloride of lime, to brighten and fix it.

VI. *Prussiate of copper* gives a bronze or yellowish-brown to silk. The piece well mordanted with blue vitriol, may be passed through a solution of *prussiate of potash.*

BROWN PIGMENTS. The principal and most useful of these are, umber and terra di sienna, both burnt and raw. Brown may also be made of almost any shade, by the admixture of blacks with reds and yellow, or with greens, in different proportions.

BROWNING, (IN COOKERY.) A fluid preparation used to color and flavor gravies, soups, &c.

Prep. I. Melt 4 oz. of sugar in a frying-pan, or other convenient vessel, with water, add 1 oz. of butter, and continue the heat until the whole is turned quite brown; then pour in 1 pint of port

wine, stirring well all the time, and remove the pan from the fire. When the whole of the roasted sugar is dissolved, pour it into a bottle, and add ½ oz. each of bruised pimento and black pepper; 6 shalots cut small; a little mace and finely-grated lemon-peel; and a quarter of a pint of mushroom catsup. Digest for a week, occasionally shaking; then strain through a piece of muslin, and preserve for use.

II. Instead of port wine use water, and add a glass of spirits.

III. Sugar coloring 1 pint; salt ¼ lb.; mushroom catsup ½ pint; add spice.

IV. Lump sugar (powdered) 2½ lbs.; salad oil ¼ lb.; heat in an iron vessel until quite brown, then add port wine 1 quart; Cape wine 3 quarts; shalots 6 oz.; mixed spice 4 oz.; black pepper 6 oz.; mace 1 oz.; salt ¾ lbs.; lemon juice ½ pint; catsup 1 quart.

V. Good spirit, or sugar coloring, and mushroom catsup, of each 1 gal.; Jamaica pepper, black pepper, and shalots, of each 4 oz.; cloves, cassia, and mace, bruised, of each ¾ oz.; boil in a covered vessel for 5 minutes, then digest for 14 days, and strain.

BROWNING FOR GUN BARRELS. *Prep.* I. Mix 1 oz. each of aquafortis and sweet spirits of nitre; 4 oz. of powdered blue vitriol; 2 oz. of tincture of iron, and water, 1½ pint; agitate until dissolved. *Use.* Rub this on the barrel, previously well polished, and afterwards cleaned off with whiting to remove the oil. Let it remain till the next day, then rub it off with a stiff brush. The liquid may be again applied until a proper color is produced. When this is the case, wash in pearlash water, and afterwards in clean water, and then polish, either with the burnisher or with bees-wax; or apply a coat of shellac varnish. (See below.)

II. Blue vitriol and sweet spirits of nitre, of each, 1 oz.; water 1 pint; dissolve as last.

III. Mix equal parts of butter of antimony and sweet oil, and apply the mixture to the iron previously warmed.

Remarks. The varnish used for gun barrels, after they are bronzed, is made by dissolving 1 oz. of shellac and one or two drachms of dragon's blood, in a quart of alcohol; and filtering the solution through blotting paper into a bottle, which must be kept closely corked.

BRUCINE. *Syn.* Brucia. Brucina. Vomicina. A vegetable alkali, discovered by Pelletier and Caventou, in the bark of the Brucia antidysenterica, and afterwards combined with strychnia in nux vomica.

Prep. Digest ether on the powdered bark of brucia antidysenterica, to separate a fatty matter; strain, add alcohol at 36° Baume; digest, filter, evaporate to dryness; dissolve the mass in water, add liquid subacetate of lead; filter, pass sulphureted hydrogen gas through the clear liquor; filter again, and add calcined magnesia; filter again, wash the sediment very slightly with cold water, dry, digest in alcohol, filter, and distil off the spirit. To purify the brucine, add a solution of oxalic acid, crystallize, add a mixture of alcohol at 40° Baume, and ether at 60°, to extract the coloring matter, then dissolve the oxalate of brucine in water, add calcined magnesia, filter; digest the sediment in alcohol, filter, and let the spirit evaporate by exposure to the air.

Prop., Use, &c. The crystals thus obtained are soluble in 850 parts of cold and 500 parts of boiling water. When added to the dilute acids until they are neutralized, brucia forms crystallizable salts, easily obtained by evaporation. Of these, the sulphate and bisulphate, the muriate, phosphate, nitrate and binitrate, acetate, oxalate, and some others have been examined. Most of these, especially the first three or four, are very soluble in water. Its physiological effects are similar to strychnia, but it is said to possess only $\frac{1}{12}$ of the strength of that alkali. According to Dr. Fuss and Professor Erdeman, it is not a distinct alkaloid, but a compound of strychnia and resin. *Dose.* ¼ gr. to 2 or 3 grs. daily, in the form of pills or solution. It is given in similar cases to those for which strychnia is prescribed: viz. paralysis, impotence, and other affections of the nervous system. It is a violent poison. Its antidotes are the same as those for strychnia. *Tests.* Nitric acid gives it a fine red color, which is removed by sulphureted hydrogen and sulphurous acid. Iodic acid, chloric acid, and chlorine, also turn it red.

BRUCINE, PILLS OF. *Prep.* Brucia 2 grains; conserves of roses and liquorice powder, of each, 1 scruple; mix and divide into 16 pills. *Dose.* 1 to 6 daily, at first, gradually increasing the dose.

BRUISES. *Treat.* These may be rubbed with a little opodeldoc or soap liniment; or if the inflammation be considerable, they may be washed with a little weak goulard water, or leeches may be applied to the part.

BRYONIN. A peculiar bitter principle, extracted from the white bryony or mandrake root. It is obtained from the expressed juice by filtration, evaporation to dryness, and re-solution in alcohol. It is a drastic purgative and poisonous. It forms a yellowish white mass.

BUBBLE AND SQUEAK, (in Cookery.) *Prep.* Cut slices from a cold round of beef; let them be fried quickly until brown, and put them into a dish to keep hot. Clean the pan from the fat; put into it greens and carrots previously boiled and chopped small; add a little butter, pepper, and salt; make them very hot, and put them round the beef with a little gravy. Cold pork boiled is a better material for bubble and squeak than beef, which is always hard; in either case the slices should be very thin and lightly fried.

BUGS. Various means have been proposed to drive away these nocturnal marauders and enemies of "*tired nature's sweet restorer, balmy sleep.*" Among the most certain of these is cleanliness. The furniture brokers put articles infested with this insect population into a room with doors and windows fitting quite close, when they subject them to the fumes of burning sulphur or chlorine In the small way, poisonous mixtures are frequently resorted to, with which the articles are washed. The following form is that usually employed:—

Corrosive sublimate and muriatic acid, of each, 1 oz.; water 4 oz. Dissolve, then add turpentine and decoction of tobacco, of each, ½ of a pint. Mix.

*** For the decoction of tobacco, boil 2 oz. of

tobacco in a pint of water. This mixture must be applied with a paint brush. *Caution.* This wash is a "*deadly poison!*"

The following extract may be of assistance to persons interested in the matter:—"These pests exist only in dirty houses. A careful housewife or servant will soon completely destroy them. The surest method of destruction is to catch them individually when they attack the person in bed. When their bite is felt, instantly rise and light a candle and capture them. This may be troublesome, but if there be not a great number, a few nights will finish them. When there is a large number, and they have gained a lodgment in the timbers, take the bed in pieces, and fill in all the apertures and joints with a mixture of soft soap and Scotch snuff. A piece of wicker-work, called a bug-trap, placed at the head of the bed, forms a receptacle for them, and then they may be daily caught till no more are left. Fumigations are very dangerous, and rarely effectual, therefore attempt no such project. Oil-painting a wall is a sure means of excluding and destroying them." (Chamber's Information for the People, No. 91, p. 653.)

BUNION. *Cause and Treat.* The *bunion*, or swelling on the ball of the great toe, is produced by the same cause as the corn—pressure and irritation by friction. The treatment recommended for corns will succeed in cases of bunions; but in consequence of the greater extension of the disease, the cure of course is more tedious. When a bunion is commencing, it may be effectually stopped by poulticing, and then opening with a lancet; but this requires caution, and should be performed with care.

BUNS. *Prep.* I. (*Cross Buns.*) To flour 2½ lbs., add sifted sugar ½ lb., and a little coriander seed, cassia, and mace, powdered fine, then make a paste with butter ½ lb., dissolved in hot milk ½ a pint, work in 3 tablespoonfuls of yeast and a little salt; set it before the fire for an hour to rise, then make it into buns, and again set them before the fire on a tin for half an hour; lastly, brush them over with warm milk, and bake them to a nice brown in a moderate oven.

II. (*Madeira.*) Butter 8 oz.; 2 eggs; flour 1 lb.; powdered sugar 6 oz.; half a nutmeg, grated; powdered ginger and caraway seeds, each 1 teaspoonful; work well together, then add sherry wine 1 glassful, and as much milk as required. Bake in tins in a quick oven.

III. (*Plain.*) *a.* Flour 2 lbs.; butter ¼ lb.; sugar 6 oz.; a little salt, powdered caraway and ginger; make a paste with yeast, 4 spoonfuls, and warm milk a sufficient quantity, then proceed as in No. I.

b. To the last add currants, well washed, ½ lb.

IV. (*Rich.*) Dried and warm flour 3 lbs.; powdered sugar 1 lb.; butter 2½ lbs., melted and beat with rose water 4 oz.; form into a light paste, with ¾ of a pint of yeast, and place it for an hour to rise, then add a little candied lemon and orange peel, and 1 lb. of currants, and make the whole into buns; set them before the fire for 40 minutes, then wash them over with milk, and put a little grated peel and a few caraway comfits on the top of each.

BURGLARIES, TO PREVENT. "In addition to the usual precautions of locks and bolts, alarum bells and firearms, three things have been found efficacious in preserving houses from nightly depredators. 1st. A *light* in the upper part of the house. 2d. A *small dog*, in a room on the ground floor, which offers the means of its running into a place of safety from its enemies: not to be fed too high, and allowed to sleep by day. 3d. Some *ashes* fresh from the fireplace spread before the door, underneath the window or other place. Thus the thieves' shoes will creak, the dog will be roused and bark, and the fear of detection by the approach of the light, will deter rogues of common feeling. At least, should they enter, the dog cannot be readily come at to be slain; and the scuffle occasioned by effecting this necessary prelude to robbery, will, in almost all cases, promote interruption from within or without."

BURNS AND SCALDS. These are too well known to require description.

Treat. When the injury is merely superficial, a little creosote may be applied to the part, and if it be a scald, the vesicle may be first pierced with a needle, and the aqueous fluid gently squeezed out. When creosote is not to be procured, a liniment formed with equal parts of soft soap, basilicon ointment, oil of turpentine and water may be used instead. When the part is very hot and painful, a poultice may be applied, on the surface of which a few drops of creosote, or the liniment, should be spread with a knife. This treatment will generally allay the pain, after which a dressing of any simple ointment may be adopted. In many severe flesh burns which I have had the misfortune to receive, I poured creosote *plentifully* over the part, which produced scarcely any smarting or pain, as is frequently asserted, whilst it removed the burning sensation that previously existed, and the charred surface assumed a dry scabby appearance, which, by dressing with simple ointment, soon came off and left the part beneath both sound and healthy. If a poultice be applied, it is best to keep it on until the next day, when in general a little spermaceti ointment spread on a bit of soft linen may be used instead. Plunging the part into cold water *immediately* on the receipt of an injury of this kind will frequently prevent any further remedy being necessary. In all cases of burns and scalds, it is necessary to observe that if fever should ensue, laxative medicines, as castor oil and epsom salts, should be administered.

BURNING LENS, CHEAP AND SIMPLE. Take two circular discs of plate glass, of the requisite dimensions, and place one at each end of a shallow tube; an inch long will be quite sufficient for any size; they are kept in their position very firmly by means of screw clamps, in an analogous manner to the two lenses for showing Newton's concentric colored rings. To the tube is fitted a short tube with a stop-cock attached; to the end of this tube a condensing syringe is fixed, and the cavity between the glasses filled with turpentine, varnish, bleached oil, or any other suitable substance of a high refractive power. When the glasses have attained the requisite degree of curvature, the stopcock may be shut, the syringe screwed off, and the fluid lens (for such in reality it is) mounted for use. (Chemist, iii. 50.)

BUTTER. *Qual., &c.* This article is perhaps

employed for this purpose with advantage. It is only necessary to mix the flour up with the jelly, instead of mere water, to add yeast and salt, and to bake in the common way. Dr. Percival has recommended the addition of salep for this purpose. 1 oz. of salep dissolved in 1 quart of water; 2 lbs. of flour; 80 grains of salt, and 2 oz. of yeast, gave 3 lbs. 2 oz. of good bread; but the same weight of materials, without the salep, gave only 2¾ lbs. If too much salep be added, however, it will give its flavor to the bread.

BREAD, WHITING'S, (PATENT.) This is made by dividing the dough into two portions; to the one a little carbonate of soda is added, to the other, a little dilute muriatic acid; they are both well kneaded separately, then mixed together, formed into loaves, and baked immediately. No yeast is used.

BREATH, FŒTID. Scarcely any thing is more disagreeable or disgusting than a stinking breath. Various means have been proposed to remove this annoyance, depending principally on the administration of aromatics, which by their odor might smother it for a time; but these require continual repetition, and are liable to interfere with the functions of digestion. The real cause of a stinking breath is either a diseased stomach or carious teeth; when the former is the case aperients should be administered; and if these do not succeed, an emetic may be given, followed by a dose of salts, or castor oil occasionally. When rotten teeth are the cause, they should be removed; or, if this be impossible, they should be kept clean. Dirty teeth often cause the breath to smell. The use of the tooth-brush should be a daily habit. Occasionally rinsing out the mouth with a little clean water, to which a few drops of a solution of chloride of lime, or chloride of soda, has been added, is an effective method. The following lozenges have also been recommended:—

Gum catechu 2 oz.; white sugar 4 oz.; orris powder 1 oz.; make them into a paste with mucilage, and add a drop or two of neroli. One or two may be sucked at pleasure.

BREAKFAST POWDER. *Syn.* RYE COFFEE. DILLENIUS'S DITTO. HUNT'S ECONOMICAL BREAKFAST POWDER. Rye roasted along with a little fat. *Use.* As a substitute for foreign coffee, of which it is one of the cheapest and best.

BREE'S ANTI-ASTHMATIC PLASTER. *Prep.* Simple diachylon 1 oz.; powdered camphor and powdered opium, of each ¼ oz.; sweet oil ½ a teaspoonful. *Proc.* Melt the plaster with the oil, then remove the vessel from the fire, and stir in the powders; spread it on leather before it gets cold. *Remark.* It is better made with only half the above quantity of opium.

BREWING. The art of making beer.

General notice. Before entering on a description of the process of brewing, it will be necessary to notice the apparatus and materials required for its conduct.

The apparatus consists of,

1. *A copper or boiler* capable of holding fully two-thirds of the quantity proposed to be brewed; with a gauge-stick to determine the number of gallons of fluid at any given depth therein. A copper holding about 140 gallons is a convenient size for brewing a quarter of malt.

2. *A mash-tub,* or *tun,* capable of containing rather more than the copper.

3. *One or more tuns, or vessels,* to ferment the beer in.

4. *Three or four shallow coolers* to reduce the wort as rapidly as possible to a proper temperature for fermenting.

5. *One or two copper or wooden bowls,* for bailing, &c.

6. *A thermometer* with a scale reaching from zero to above the boiling point of water.

7. *A suitable number of casks* (clean) to contain the beer.

8. *One or more large funnels, or tunners.*

9. *Two or more clean pails.*

10. *A hand-pump* of a size proportionate to the brewing.

These articles will vary in value from £10 upwards, to many hundreds, according to the extent of the brewing; but the whole of them, necessary for a private family, may be bought for less than the former amount. By proper care they will last for 30 or 40 years, and still be in a useful state. The place where these vessels are kept, and the operations carried on, is called the "*Brewhouse.*"

The materials necessary to brew beer are, *good malt, hops,* and *water,* and a little *yeast.*

The *malt* is bruised or crushed in a mill before brewing, that it may be acted on the more readily by the water. It should not be ground too small, as it would then make the wort thick; the crushed malt may advantageously lie for a few days in a cool situation, by which it will attract a considerable quantity of moisture from the air, and consequently its soluble portion will be the more easily dissolved out by the water used in mashing. Pale malt may be used coarser than amber or brown malt. A bushel of malt should make a bushel and a quarter when ground, and a quarter should yield between 9½ and 10 bushels, the quantity slightly varying according to the degree of bruising it has undergone. On the large scale, malt is ground in crushing mills, furnished with iron rollers; and on a small scale, by wooden rollers or small mills worked by hand. For private brewing, the malt is generally bought ready ground, for convenience sake. (See MALT.)

The hops should be those of the previous season, and for general purposes grown in Kent; but for the finer sorts of malt liquor, East Kent hops should be used; and where it is intended to be kept for some long time, those known by the names of *Country's, Alton's,* or *Farnham Hops* must be employed. The quantity of hops required to a given measure of malt varies from 2 lbs. to 8 lbs. of the former, to 1 quarter of the latter, according to the nature of the brewing. For good strong beer, 4 lbs. or 4½ lbs. is usually sufficient, but when the liquor is very strong, and it is intended to be highly aromatic, and to be kept for a long period, 1 lb. of hops may be used to every bushel of malt, or 8 lbs. to the quarter. Mild porter has about 3 lbs. to the quarter, and weak common beer has frequently only about ¼ lb. of hops to the bushel of malt. A portion of hops is also frequently added to the finer sort of beer, after it is casked, as we shall presently explain.

The water should be *soft* and *clear,* the *yeast sweet* and *good,* and all the vessels and casks both

sweet and *clean*. If this be not the case, with the latter especially, the best brewing in the world will be useless.

PROCESS OF BREWING. This may be divided into

I. *The mashing*. This operation consists in placing the ground or bruised malt in a large tub or "*tun*," known by the name of the "*mash-tun*," macerating it for some time in hot water, and lastly drawing off the wort from a hole in the bottom, over which a bunch of straw, or a strainer, or false bottom, is placed, to prevent the malt passing out along with the liquor. During the process of mashing, a peculiar principle, called by chemists *diastase*, reacts upon the starch also contained in the malt, and converts it first into a species of gum, called by the French chemists "*dextrine*," and then into a species of sugar resembling that produced by the action of sulphuric acid. The greater the quantity of starch converted into sugar in this way, the stronger and finer will be the wort. It therefore becomes a desideratum with the brewer to mash at a temperature that will most fully promote this object. It has been found that the best temperature for this purpose varies from 157° to 160°, but when more than one liquor is used, the first should be something lower than the former, the next may be between the two, and the third may slightly exceed the latter, or be about 165° or 170°. The action of the first mash is merely to extract the sugar contained in the malt already formed; that of the second to convert the starch into sugar by the action of the diastase; the third to fully complete this object, as well as to carry away the remaining portions of extract.

The mashing is usually performed by filling the copper with water, and as soon as it acquires the temperature of 145° in summer, or 167° in winter, 45 gallons are run off into the mash-tun, and 1 quarter of crushed malt gradually thrown in and well mixed by laborious working, until it becomes thoroughly incorporated and no lumps remain; the agitation is then continued for 30 or 40 minutes, when 36 gallons of water from the boiler, at a temperature of 200°, are added, and the whole again well agitated until thoroughly mixed. The mash-tun is now closely covered up, and allowed to stand for an hour or an hour and a half. At the end of this time the tap is set, and the wort is drawn off into the "underback," and generally amounts to about 50 to 52 gallons: 60 gallons of water, at a temperature of 200°, are next added to the mash-tun, previously drained well, and after being well worked, the whole is covered up as before. This mash is allowed to remain for an hour, when it is drawn off, and the malt again drained ready for the third mash. This time only 35 gallons of water are added at 200°, and allowed to stand for ½ an hour, when it is run off in the same manner as before, and the malt allowed to drain. The worts are now ready for boiling.

In some cases only the first and second mash is used for strong beer, and the third kept for table, or as water to mash a fresh quantity of malt with. In Scotland (see SCOTCH ALE) the brewer only mashes *once*, and afterwards washes his malt by frequent showers or "sparges" of water, by which he gets a wort of greater strength in proportion to its quantity. In operating as above, the average or mean temperature of the first mash is 145°, of the second 170°, and of the third 180°. In winter the mean temperature may be reckoned as 6 or 7° lower. A quarter of malt in this way will produce a wort having a specific gravity by the saccharometer of 1·234, or equal to 84 lbs. of extract. (See SACCHAROMETER.)

It is calculated that 32 gallons of the water employed in the mashing remain in the grains after the wort is drawn off.

II. *Boiling*. The wort is next transferred to the copper, and heated to the boiling point as soon as possible. In large breweries where several coppers are employed, the first mash is no sooner run into the underback, than it is transferred to the wort copper, and immediately boiled, and the successive mashings added as soon as drawn off; but in private houses, where there is only one copper, the boiling cannot be commenced until the water for the last mashing is removed. In some cases the worts are brewed separately, thus producing 2 or 3 qualities of beer, viz. *strong ale or stout, beer, and table beer*. No sooner has the boiling commenced than the hops may be added, and the boiling continued for 2 or 3 hours or more. In some breweries the beer is boiled for several hours, and in Belgium it is said that this is even continued for 10 or 12 hours, but too much boiling drives off the flavor of the hops. In general, two hours good boiling will be found sufficient. In small brewings the first wort should be sharply boiled for 1 hour, and the second for 2 hours. But if intended for beer of long keeping, the time should be extended half an hour. The hops should be strained from each preceding wort, and returned into the copper with the succeeding one. Between the boilings the fire should be damped with wet cinders, and the copper door set open.

For small-beer only half an hour is necessary for the first wort, 1 hour for the second, and 2 hours for the third.

It is reckoned that $\frac{1}{6}$ to $\frac{1}{10}$ part of the wort is dissipated in steam during the process of boiling, but this must of course depend altogether on the evaporative power of the boiler and the length of time the boiling is continued.

III. *Cooling*. The boiling being finished, the wort is run off from the copper into the hopback, which is furnished with a strainer to keep back the hops. It is then pumped into large square shallow vessels called "*coolers*," where it is exposed to a good current of air to cool it down to a proper fermenting temperature as quickly as possible. This is of the utmost importance for the success of the brewing. The wort should be laid so shallow as to cool within 6 or 7 hours to the temperature of about 60°. In warm weather, the depth should not exceed 3 or 4 inches; but in cold weather it may be 5 or 6 inches. As soon as the heat has fallen to about 60°, it should be instantly tunned and yeasted.

It is reckoned that by the joint evaporation from the boilers and coolers, there is a loss of about 40 gallons per quarter.

In private families a good way is to bring the wort from the copper in pails, and to pour it into a basket or a hamper, set over the coolers, by which means the hops will be retained, and the beer run through clear.

BOYLE'S FUMING LIQUOR. Hydrosulphuret of ammonia is usually employed and sold for this article, but the liquor prepared by Boyle's process contains an excess of sulphur. (Gay Lussac.) The properties of both are however the same.

Prep. Mix 4 parts of fresh slaked lime; 2 of sal ammoniac, and 1 of sulphur, then submit the mixture to distillation.

BRA GRAS. Tar, black rosin, and the dregs of strained rosin, melted together.

BRAIN CAKES. *Prep.* Clean, wash, blanch, and soak the brains, then beat them up with a little white pepper and salt, a sage-leaf or two, scalded and finely chopped, and the yelk of an egg; make them into small cakes or fritters, and fry them.

BRAN. The husk of wheat which immediately covers the grain, and which is left in the bolting machine. *Use.* It is largely employed by the calico printers, when diffused through hot water, to remove the coloring matter from those parts of their goods which are not mordanted. A handful mixed with a pail of warm water, forms an excellent emollient foot-bath. Infused in water, (*bran tea,*) and sweetened, it forms a popular demulcent, much used in coughs and hoarseness, and, taken in quantity, proves gently laxative. It also forms an excellent manure, and, from containing the ammoniaco-magnesian phosphate, is especially adapted for potatoes. It is frequently mixed with flour and made into bread, by the poorer orders.

BRANDY. *Syn.* Eau de Vie. Aqua Vitæ. Spiritus Gallicus. Brandy-wine. The spirituous liquor obtained by the distillation of wine. When first distilled it is colorless, and only acquires a yellowish tint from the wood of the casks, in which state it is known and sold as pale or white brandy. The deep color that it usually possesses, is imparted to it by adding a little spirit coloring, (burnt sugar or caramel,) and occasionally a little red sanders wood as well, and is intended to imitate the appearance acquired by brandy from great age, when kept in wood. The natural color, however, which the spirit receives from the cask, no matter how long it may have been in it, never exceeds an amber tint, about the common color of pale Jamaica rum; but the public taste has been gradually vitiated in this respect, until only a spirit of a lively and full "*brandy color*" (unless for a pale brandy) will sell.

The brandies most esteemed in England are imported from France, and are those of Cognac and Armagnac, the preference being generally given to the former. The brandies of Rochelle and Bordeaux may be reckoned next in quality, while those obtained from Portugal, Spain, and Italy are very inferior.

The constituents of brandy are alcohol and water, and small quantities of volatile oil, acetic acid, acetic ether, œnanthic ether, coloring matter, and tannin. It is from the presence of the last six of these substances that the spirit derives its distinguishing smell and flavor. The quantity of alcohol present in brandy varies from 48 to 55 per cent. When first imported, it is generally 1 or 2 overproof, but by age its strength is lessened, and by the time it is usually taken from the bond store for sale, seldom exceeds 3 or 4 underproof. From considerable personal acquaintance with the cognac trade, I feel confidence in asserting, that brandies of the best quality seldom exceed proof, and are generally below it, and that it is a common practice in France to add spirit of wine and coloring to raise the strength to any given point desired by the English purchaser, and to charge the same in the invoice; or where the purchaser is not *well acquainted with the subject*, and desires a strong spirit at a low rate, to sell him brandy so mixed as genuine. The very finest brandies average from 5 to 10 u. p., and never exceed about 2 u. p.; they then contain more than ½ their weight of water, and from their boiling point being higher, they come over more highly charged with essential oil, and other volatile and fragrant principles of the grape, and thus possess in a greater degree that peculiar aroma and flavor for which they are so much esteemed. French brandy or wine, distilled at a low temperature in a water bath, yields a very pure and scarcely flavored spirit.

The quality of the brandy imported from France varies considerably from that which is drunk on the continent, principally from its being *prepared*, or, as it is technically termed, "*made up,*" for the London market, which means lowering it by the addition of spirit, coloring, &c. above described. The common strength at which foreign brandy is sold in England is about 11 or 12 u. p., and below 17 u. p. it becomes seizable by the excise. The strength at which it is sold and permitted in trade, is generally 10 u. p., to which it is reduced by adding water, and never less than 12 u. p., unless it be specially agreed upon. In large quantities and from bond, of course the strength depends much upon the age and quality of the spirit. A fine old brandy being, perhaps, 8 or 10 *u. p.*, while one of the last year's vintage of a commoner quality may be as strong as 2 or 1 *u. p.* But these distinctions are familiar to every experienced brandy dealer.

In France there are several varieties of this spirit distilled, which are known by names descriptive both of their quality and source. The "*eau de vie supérieure,*" or *cognac brandy*, is generally obtained from pale white wines, by careful distillation, and is remarkable for its superior flavor. When kept in glass or stone bottles, it is called white cognac brandy, and the same term is also generally applied when it has been kept in casks, but has not been artificially colored; in the latter case, however, it generally acquires a pale amber tint.

The "*eau de vie ordinaire,*" or *common brandy*, is distilled from high-colored white or red wines, and has generally a sp. gr. of 0·948, and varies from 22 to 27 u. p.

The "*eau de vie de marc*" is obtained from the lees of vinegar and other wines, the marc or cake of grapes from which the juice has been pressed, and the commonest red wines, fermented and distilled together by a quick fire, to drive over as much essential oil and flavoring as possible.

The "*eau de vie seconde*" is the weak spirit that passes over after the stronger spirit has been drawn off, and the receiver changed. *It is used* for common drinking, or mixed with other brandy.

The "*eau de vie à preuve d'Hollande*" is brandy about 19° Baume, or sp. gr. ·9420, the common strength at which it is retailed in France, and will stand the "*proof*" or "*bead*"

The "*eau de vie à preuve d'huile*" is the strongest brandy usually drunk; it is about 23° Baume, or sp. gr. ·918; pure olive oil will just sink in it; hence the above term.

The "*eau de vie fort*" is usually prepared by the redistillation of common brandy, keeping the first portion separate. It answers to our spirit of wine. It is made of 12 different strengths, distinguished by names, exhibiting the quantity of water required to reduce the sample to the "*preuve d'Hollande*." The weakest is called cinq-six, or $\frac{5}{6}$, and the strongest trois-neuf, or $\frac{3}{9}$, the difference between the numerator and the denominator being the quantity of water the 3 parts of the former will take to reduce it to the "*preuve*," when it would make 9 parts. Its sp. gr. is about ·839.

The *esprit de vin* is brandy or spirit rectified to 0·890 and upwards.

The general method of distilling brandy in France differs in no important particular from that practised in England, for grain or molasses spirit. Neither are the French workmen more skilful nor more cleanly in their operations than the English. It is the materials alone that, in this case, conduce to the superiority of the product. The quality of the brandy varies with that of the wine from which it has been distilled. Every soil, every climate, every kind of grape, produces a wine possessing some peculiarity confined to itself, and this wine on distillation produces a spirit possessing like distinctions. A large quantity of brandy is prepared in France soon after the vintage, as the juice of the poorer grapes that is unfit for wine is fermented and at once distilled. It is a general rule, in France, to distil only such wines as are unsaleable, as the profits on the wine, sold as such, are much greater than when it is converted into brandy.

THE STRENGTH OF BRANDY may be ascertained in the same way as alcohol, for which purpose Sike's hydrometer is used in England. In France, from the value of spirit being less, it is frequently tested by simpler methods, though great accuracy obtains, in this particular, where necessary.

Pur. Very little perfectly pure French brandy is obtained by the small consumer in England, as it is not only generally lowered a little by the wholesale dealer, but undergoes a like process at the hands of the retailer. The safest method is either to procure it direct from the bond store, without its even entering a private cellar, or to buy of some known respectable party, and to pay a price that will offer no inducement to dishonesty. If this be not done, by all means buy British brandy, which is now made of excellent quality by many of the leading houses, as *Betts*, *Bretts*, *Booth*, and *Grimble*. From the two former a single sealed bottle may be procured at the same price as by the gallon.

The importation of foreign brandy for home consumption amounts to about 1,400,000 gallons a year.

BRANDY, (REDUCED.) I. To 20 gallons of Cognac brandy add 5 gallons of the best British brandy.

II. To 72 gallons of full-flavored French brandy, add 10 gallons of spirit of wine, (58 *o. p.*,) 8 gallons of water, and 1 pint of good coloring. Rummage well up and let it stand until the next day.

Remarks. The above reduction is generally adopted in trade, and is known by the name of "*improving*." But such is the poverty of the palate of the English brandy drinker, that the adulteration is often not suspected, even when it is carried to double the extent of the above, which is generally exceeded in the hands of the retailer. So long, however, as the foreign spirit constitutes about half of the mixture, and was at first of decent quality and age, the infatuated Englishman smacks his lips, and cunningly holding up his glass between the light and his eye, exclaims, "*Ah! this is a drop of the real.*"

BRANDY, (BRITISH.) *Syn.* BRITISH COGNAC. IMITATION COGNAC, &c. From the heavy duty levied on French brandy imported into England for home consumption, it has become a desideratum with the distiller (rectifier) to produce an English spirit of a similar description. For some time the attempt proved quite unsuccessful, but of late years much capital and talent have been embarked in the pursuit, and the result has proved very satisfactory. An article of British manufacture may now be purchased, at a very reasonable rate, of really respectable quality, and possessing much of the flavor and aroma of foreign brandy, while, as a beverage, it is equally wholesome. Much of the British brandy, however, that is commonly met with, is of such a wretched quality as to be quite undeserving of the name, which is evidence of the fact, that much skill and experience is required to ensure success in its manufacture. For a long time this liquor was distilled from spoilt wine and dregs of wine, both British and foreign, mixed with beer bottoms and similar articles; and when, instead of these, corn, malt, and molasses spirit were employed, it was considered as an unpardonable and wicked misuse of those articles. Modern experience has proved, however, that perfectly pure and tasteless malt spirit is the best article to form into an imitation brandy.

The following formulæ, by skilful management, will produce very good brandy, but it must be recollected that much depends on the quality of the materials employed, as well as on the operator. As the strength and quality of the ingredients, and the methods of manipulation vary, so will the result; much must therefore be left to the judgment and discretion of the artist. It offers a profitable pursuit to the ingenious and industrious chemist and rectifier.

Prep. I. Take 12 gallons of the finest flavorless malt spirit at proof, (or if of a different strength a proportionate quantity;) add thereto 5 gallons of water, $\frac{3}{4}$ lb. of the best crude red tartar or winestone, previously dissolved in 1 gallon of boiling water; $\frac{1}{4}$ pint of acetic ether; 2 quarts of good French wine vinegar; 7 lbs. of bruised French plums, and 1 or 2 gallons of wine bottoms or flavor stuff from Cognac, mix them in a fresh-emptied sherry cask, and let them stand together for 14 days, frequently rummaging up the liquor with a stick; next draw over 15 gallons of the mixture from a still furnished with an agitator. Put the rectified spirit into a clean, fresh-emptied Cognac brandy cask, and add thereto $\frac{3}{4}$ pint of tincture of catechu, 1 lb. of fresh and clean oak shavings, and about a pint of good spirit coloring. Bung close, and agitate occasionally for a few days. *Remarks.* Age improves the above article, and renders it

"Metallic spoons are used when the substance to be examined is intended to be exposed to the action of heat only, and might undergo some change by immediate contact with the charcoal. When the spoon is used, the flame of the blowpipe should be directed to that part of it which contains the substance under examination, and not be immediately applied to the substance itself. The handle of the spoon may be inserted into a piece of charcoal; and if a very intense heat is required, the bowl of the spoon may be adapted to a hole in the charcoal. Small portions may be taken up by platina forceps. Salts and volatile substances are to be heated in a glass tube closed at one end, and enlarged according to circumstances, so as to form a small matrass."

When the behavior of the substance has been observed in this way, it is melted with various fluxes, as microcosmic salt, borax, &c., and their action examined, both in the interior and exterior flame, by which means its composition may be generally ascertained, by reference to any work on mineralogy.

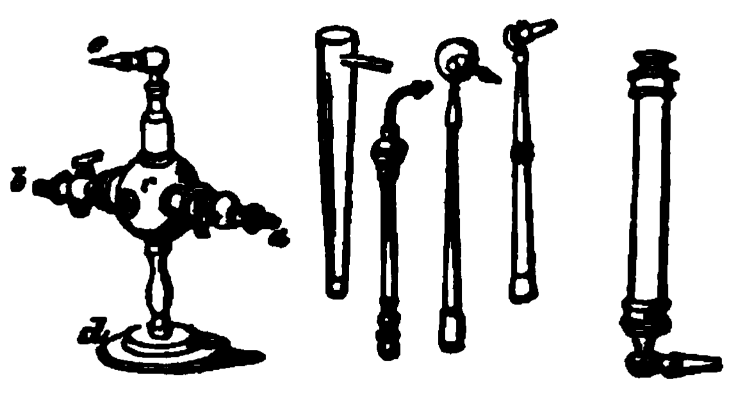
Beginners are usually unable to maintain a continual stream of air from the jet, which is, however, very simple to accomplish. The operation depends upon a little artifice in blowing through the pipe, which is in reality more difficult to describe than to acquire. "The effect intended to be produced is a continual stream of air for many minutes, if necessary, without ceasing. This is done by applying the tongue to the roof of the mouth, so as to interrupt the communication between the mouth and the passage of the nostrils; by which means the operator is at liberty to breathe through the nostrils, at the same time that by the muscles of the lips he forces a continual stream of air from the anterior part of the mouth through the blowpipe. When the mouth begins to be empty, it is replenished by the lungs in an instant, while the tongue is withdrawn from the roof of the mouth, and replaced again in the same manner as in pronouncing the monosyllable *tut*. In this way, the stream may be continued for a long time without any fatigue, if the flame be not urged too impetuously; and even in this case no other fatigue is felt than that of the muscles of the lips." (Ure.)

For producing extreme degrees of heat, the flame is blown with a jet of oxygen gas, and the instrument is then called an "*oxygen blowpipe;*" or a mixture of oxygen and hydrogen is burned, when it is called an "*oxy-hydrogen*" blowpipe. The heat produced by the last is so great that no substance can stand before it. The most refractory native compounds, as rock crystal, quartz, flint, chalk, plumbago, &c., are immediately fused. Gold is volatilized, and iron is rapidly consumed the instant it is placed in the flame. To use this wonderful instrument with safety, and to prevent an explosion, a peculiarly constructed jet is required. The principal blowpipes in general use are figured in the accompanying engravings. The shape of the common blowpipe adopted by the experimentalist may depend upon the fancy of its employer.

This apparatus is also furnished with valves and springs.

Beside the following there are several other va-

1 2 3 4 5 6



1, Oxy-hydrogen blowpipe.
2, Black's do.
3, Bergman's do.
4, Pepy's do.
5, Wollaston's do.
6, Hemming's safety jet for the oxy-hydrogen ditto.

a, Pipe conveying oxygen gas.
b, Do. do. hydrogen gas.
c, Ball stuffed with fine wire gauze.
e, Jet, (internal diameter 1-80th of an inch.)

rieties of blowpipes, in which the air is expelled by the pressure of a column of water, (hence called "*hydrostatic blowpipes,*") or the flame blown with the vapor of boiling alcohol, ("*spirit blowpipe.*")

Use. The blowpipe is of most extensive application in qualitative analysis, especially of minerals, and its use cannot be too highly recommended to the young chemist.

For further information on this subject the reader is referred to Gahn on the Blowpipe; to Ure's Dictionary of Chemistry; to Campbell's Translation of Kobell's Instructions for the Discrimination of Minerals; and to the Chemist, iv. 462.

BLUBBER. This substance, which is so plentiful on some parts of the coast of England, forms a very rich manure for pasture and arable land, when used at the rate of 1 ton to every 20 or 30 loads of mould, together with a chaldron of lime per acre. It must be well turned over, and after lying 3 or 4 months the land will be in prime condition.

BLUE, CHARCOAL. *Prep.* Triturate carbonized vine stalks with an equal weight of potash, then put it into a crucible and place it over the fire, until the mixture ceases to swell, keeping it well stirred all the time; next allow it to cool, dissolve it in water, and saturate the excess of alkali with dilute sulphuric acid; the liquid becomes blue, and a dark precipitate falls down, which turns of a brilliant blue color when dried and heated.

BLUE, COBALT. *Prep.* I. Dissolve Zaffre 1 lb. in ¾ lb. of nitric acid, diluted with an equal weight of water, by digestion for some hours, evaporate nearly to dryness, then dissolve in warm water, filter and add a solution of phosphate of soda as long as any precipitate falls down; collect this on a filter and wash it with cold water, then mix it while still moist with 8 times its weight of freshly precipitate hydrate of alumina, also well washed and still moist. Stir them together until dry; lastly, expose the mixture to a cherry red heat in a crucible, after which cool the mass, and reduce it to a fine powder.

II. Precipitate a solution of nitrate of cobalt as above, and proceed as before.

III. Make a strong solution of neutral nitrate

of cobalt, and mix it with pure moist alumina, then dry it and proceed as before.

IV. Precipitate a solution of nitrate of cobalt with ammonia alum, collect the precipitate, wash, dry, and heat it to a cherry red as before.

Use. A beautiful blue pigment, very permanent.

BLUE, CHEMIC. *Syn.* SAXON BLUE. LIQUID BLUE. SULPHATE OF INDIGO. *Prep.* I. Indigo 1 lb.; oil of vitriol 8 lbs. *Proc.* Put the acid into an earthenware pan, placed in a tub of water to keep it cool, and add the indigo, previously reduced to fine powder, in small successive portions, carefully stirring to prevent it *heating.* When all the indigo has been added, cover up the vessel and let it stand for 4 hours, occasionally stirring it during the time; lastly, dilute it with an equal weight of water.

II. Indigo 1 oz.; oil of vitriol 4 oz.; dissolve as before; the next day add 1 oz. of dry potash; let it stand a day longer, then dilute it with 12 oz. of water.

Use. In dyeing greens and blues, either without preparation or with a mordant of alum and tartar.

BLUE, CHINA. *Syn.* ROYAL SMALTS. *Prep.* Grind together oxide of cobalt or zaffre, with an equal weight of potash, and 8 times its weight of feldspar. Then submit the mixture to fusion in a crucible. *Use.* To paint pottery, and as a pigment.

BLUE, IRON. *Prep.* Precipitate a filtered solution of protosulphate of iron, with another of phosphate of soda. Collect the powder, wash and dry it. *Use.* A lively sky-blue.

BLUE, MOLYBDENUM. *Prep.* Dissolve sulphuret of molybdenum in nitric acid, then add some tin filings and a little muriatic acid. After digestion for some time, pour off the clear and evaporate to dryness. Mix the powder thus obtained with moist hydrate of alumina, as in making cobalt blue, and heat it to nearly a dull red.

BLUE, MOUNTAIN. Carbonate of copper, mixed with earthy matter.

BLUE, SAXON. *Prep.* Dissolve 1 oz. of sulphate of iron and 8 oz. of alum in 1 gallon of water, then add simultaneously, separate solutions of prussiate of potash and common pearlash, until they cease to produce a precipitate; lastly, allow the liquid to deposite, decant the clear portion, wash the remainder well with water, and dry it. Or a solution of the sulphate of iron may be first made and precipitated with the prussiate of potash, and instantly mixed with the solution of alum and a solution of pearlash, added until it ceases to produce a precipitate.

BLUE, SUPERB LIQUID. *Prep.* Put into a small matrass or common vial 1 oz. of pure Prussian blue reduced to powder, and pour over it from 1½ oz. to 2 oz. of concentrated muriatic acid. The mixture produces an effervescence and the prussiate soon assumes the consistence of thin paste. Leave it in this state for 24 hours, then dilute it with 8 or 9 oz. of water, and preserve the color thus diluted in a bottle well stopped.

The intensity of this color may be lessened, if necessary, by new doses of water. If the whole of this mixture be poured into 1 quart of water, it will still exhibit a color sufficiently dark for washing prints.

BLUE, STONE. *Syn.* FIG BLUE. THUMB BLUE. KNOB BLUE. CROWN BLUE. MECKLENBURG BLUE. QUEEN'S BLUE. *Prep.* Mix finely powdered indigo with starch paste until a proper color be produced, then make it into small lumps. II. Instead of starch use whiting and a little weak size. *Use.* Employed by laundresses to give a faint blue tinge to linen.

BLUE DYE. *Proc.* First give the goods a mordant of alum, then rinse them well and boil them in a bath of logwood, to which a small quantity of blue vitriol has been added.

II. Boil in a bath of logwood, then add 1 oz. each of tartar and verdigris to every pound of logwood employed, and boil again.

III. Bilberries, elder-berries, mulberries, privet-berries, and several other vegetable blue substances, may be used to dye blue as above instead of logwood.

Remarks. By increasing the proportion of alum the color verges on purple, and by employing a little acetate of iron or green copperas, the darker shades are produced. Verdigris, blue vitriol, and alkalis turn it more on the blue, and a mordant of tin imparts a violet cast. None of these dyes, however skilfully managed, are so permanent as those produced with indigo and Prussian blue. (See INDIGO, PRUSSIAN BLUE, and DYEING.)

BOARDS, MARBLE, &c., TO TAKE OIL AND GREASE OUT OF. I. Make a paste with fuller's earth and hot water, cover the spots therewith, let it dry on, and the next day scour it off with soft or yellow soap.

II. Make a paste with soft soap, fuller's earth, and a little pearlash, and use it as above.

III. Make a paste of fresh slaked lime, water, and pearlash, and use it as above. *Remarks.* Observe not to touch the last mixture with the finger, as it is very caustic unless it be largely diluted with water.

BOERHAAVE'S RULES FOR PRESERVING HEALTH.

"Keep the feet warm;
The head cool; and
The body open."

These rules are very concise, and convey directions which, though valuable, are too often neglected.

BOILING POINT. The boiling point of water may be raised considerably above 212° Fahr. by the addition of saline matter. Thus, 60 parts of dry acetate of soda added to 40 of water raise the boiling point to 256° Fahr., and 30 parts of muriate of soda added to 70 of water raise it to 224 Fahr. As in practice, however, it proves inconvenient to employ a saturated solution for a bath, from the evaporation of the water continually inducing the salt to crystallize, it is usual to keep it considerably below that point. By means of such solutions the chemist is enabled to evaporate fluids and desiccate solids at any required temperature. The boiling point of baths containing different salts may be seen below.

TABLE of the Boiling Points of several Saline Solutions, abridged from the Table of Mr. T. GRIFFITHS. (Jour. Science, xviii. 89.)

Names of Salts.	Dry Salt in 100.	Boiling Point.
Acetate of soda, . . .	60	256° F.
Nitrate of soda, . . .	60	246
Rochelle salt, ...	90	240
Nitre, ...	74	238
Muriate of ammonia, .	50	236
Tartrate of potash, . .	68	234
Muriate of soda, . . .	30	224
Ditto, ...	20	218·75
Muriate of lime, . . .	40	216·5
Sulphate of magnesia, .	57·5	222
Supersulphate of potash,	?	222
Borax, ...	52·5	222
Phosphate of soda, . .	?	222
Carbonate of soda, . .	?	220
Muriate of baryta, . .	45	220
Alum, ...	52	220
Sulphate of potash, . .	17·5	215
Bitartrate of potash, .	9·5	214
Sulphate of soda, . .	31·5	213

Remarks. From 5 to 9 degrees are usually lost by passing through the vessel, depending on its thickness and materials. The boiling point of water in glass vessels, under common circumstances, varies from 212·54° to 215·6°, and in perfectly pure and smooth glass vessels, water may be heated to 221° F. without boiling. (M. F. Marcet.)

BOILS. *Treat.* When these appear, suppuration should be promoted by poultices of bread and linseed meal, to which a little fat or oil may be added, to prevent their getting hard. When poultices are inconvenient, exposure to the vapor of hot water, or the application of stimulating plasters, may be adopted instead. When sufficiently ripe, the matter should be evacuated, and the wound dressed with a little simple ointment spread on a piece of clean lint or linen. The diet may be full and liberal until the maturation of the tumor and the discharge of the matter, when it should be lessened, and the bowels opened by some saline purgatives, as salts or cream of tartar. When there is a disposition in the constitution to the formation of boils, the bowels should be kept regular, and tonics, as bark or steel, taken, with the frequent use of sea-bathing, if possible.

BOLAS. *Prep.* Into 2 lbs. of flour pour ¾ pint of warm milk, a small teacupful of yeast, and 6 eggs; make them into a dough, add 1 lb. of butter, by degrees, and let it rise for 1 hour, then mix in 1 lb. of powdered sugar, and make the mass into cakes; put these into cups or tins previously well buttered, and ornament the top with candied orange or lemon peel; lastly, bake them.

BOLUS OF ALUM. *Prep.* Powdered alum and conserve roses, of each 15 grs.; sirup of orange peel or saffron to mix. *Used* in fluxes, &c.

BOLUS OF MUSK. *Prep.* I. Musk 15 grs.; camphor 5 grs.; powdered gum 3 grs.; mix with sirup of saffron. *Use.* In convulsions and typhus fever.

II. Musk and carbonate of ammonia of each 10 grs.; conserve of roses q. s.; to make a bolus. *Use.* Sometimes given every three hours in mortification accompanied with spasms.

BOLUS, PURGING, (FOR DOGS.) *Prep.* Jalap and rhubarb, of each 15 grs.; ginger 4 grs.; soap 10 grs.; water q. s.; if this does not open the bowels, add aloes half a drachm, or 3 or 4 grs. of calomel. *Use.* In the distemper; it must be preceded by copious bleeding, and abstinence from food for a day or a night.

BOLUS OF SULPHATE OF ZINC. *Prep.* Sulphate of zinc 20 to 25 grs.; conserve of roses q. s. to make a bolus. *Use.* As an emetic where poison has been taken, to be followed by copious draughts of warm water or weak tea.

BOLETIC ACID. An acid discovered by Braconnot in the juice of the boletus pseudo-igniarius.

Prep. Concentrate the expressed juice to a sirup by means of a gentle heat, then digest it in strong alcohol, and dissolve the residuum in water; add a solution of nitrate of lead as long as any precipitate falls, which must be washed with water, diffused through water in a tall glass vessel, and in this state a current of sulphureted hydrogen must be passed through it, until the lead is thrown down; filter, evaporate, and crystallize; lastly, purify by resolution and crystallization from alcohol.

Remarks. This acid dissolves in 45 parts of alcohol and 180 of water, and is volatile. It is doubtful whether it be a distinct acid principle.

BOLOGNA VIAL. The bologna, or philosophical vial, is a small vessel of glass which has been suddenly cooled, open at the upper end, and rounded at the bottom. It is made so thick at the bottom that it will bear a smart blow against a hard body without breaking; but if a little pebble, or piece of flint, is let fall into it, it immediately cracks, and the bottom falls into pieces; but unless the pebble or flint is large and angular enough to scratch the surface of the glass, it will not break.

BOLOGNIAN PHOSPHORUS. *Syn.* BOLOGNIAN STONE. This is a phosphorescent stone that once excited great attention. It was accidentally discovered by a shoemaker of Bologna in the 17th century. A family of the name of Logani, who were very successful in making it, acquired a large fortune by selling it to the curious throughout Europe.

Prep. Powder native sulphate of baryta that has been previously ignited, and make it into a paste with mucilage of gum arabic; roll this into pieces a quarter of an inch thick, and dry them in a moderate heat; then expose them to the heat of a wind furnace by placing them loose among the charcoal.

Prop., Use, &c. Placed in a vial and exposed for a few minutes to the sun's rays, it will give light enough in the dark to see the figures on the dial-plate of a watch.

BOMBIC ACID. An acid which M. Chaussier extracted from the silkworm in 1781. It has since been found not to be a distinct acid.

BON-BONS. *Prep.* Provide leaden moulds, which must be of various shapes, and be oiled with oil of sweet almonds. Take a quantity of brown-sugar sirup in the proportion to their size, in that state called a *blow*, which may be known by dipping the skimmer into the sugar, shaking it, and

blowing through the holes, when parts of light may be seen; add a drop of any esteemed essence. If the *bon-bons* are preferred white, when the sugar has cooled a little, stir it round the pan till it grains, and shines on the surface; then pour it into a funnel and fill the little moulds, when it will take a proper form and harden: as soon as it is cold take it from the moulds; dry it for two or three days, and put it upon paper. If the *bon-bons* are required to be colored, add the color just as the sugar is ready to be taken off the fire.

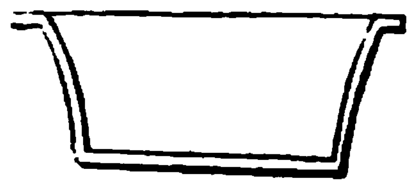
BONES. The bones of animals are employed for various purposes in the arts, manufactures, and domestic economy. (See the succeeding articles.)

BONE ASH. *Syn.* IMPURE PHOSPHATE OF LIME. *Prep.* Calcine bones to whiteness, and reduce the ash to fine powder. *Use.* To make pure phosphate of lime, and to form cupels. It is sold for burnt hartshorn.

BONE BLACK. *Syn.* ANIMAL CHARCOAL. IVORY-BLACK. Bones burnt in close vessels.

Prep. On the large scale, two different processes are adopted to produce bone black.

I. (*From bones as the sole product.*) The bones broken to pieces are put into small cast-iron pots of the shape of the engraving, and varying from



$\frac{1}{4}$ to $\frac{1}{2}$ an inch in thickness. Two of these being filled, are dexterously placed with their mouths together and then luted with loam. A number of vessels, thus prepared, are placed side by side and over each other, in an oven resembling a potter's kiln, to the number of 100 to 150. The fire is then kindled, and the heat kept up strongly for 10 or 12 hours, according to circumstances, until the process is completed. The whole is allowed to cool before opening the pots.

II. (*The residuum of the manufacture of Bone Spirit.*) The bones are here introduced into retorts similar to those used at the gas works, and heat being applied, the volatile products are conveyed away by iron pipes to cisterns where its condensable portion is collected. As soon as the process of distillation is finished, the solid residuum in the retorts, while still red hot, is removed through their lower ends into wrought-iron canisters, which are instantly closed by air-tight covers, and luted over. These are then raised to the ground by a crane and allowed to cool.

Remarks. Previously to distillation or calcination, the bones are boiled for their grease, which is sold to the candle and soap makers. They are then sorted, the finest pieces being selected for making handles for knives, tooth-brushes, buttons, &c.; the next sort for making into bone black; while the smallest and worst description is reserved for grinding into manure. The bones lose about $\frac{1}{2}$ their weight by the process of burning. After this they are ground in a mill, sorted by sieves into two kinds, one *granular*, somewhat resembling gunpowder, and the other *quite fine.* The one is sold under the name of *animal charcoal*, for decoloring liquors, the other as a *pigment.* This article possesses the valuable property of taking lime from sirups, at the same time that it decolors them. Its power as a decolorizer may be tested by adding it to a solution of brown sugar or molasses, or water containing $\frac{1}{1000}$ part of indigo dissolved in sulphuric acid. The test should be made in a small glass tube. By well washing and careful reburning, this charcoal may be used any number of times as a decolorizer.

BONES AND IVORY, DYES FOR. 1. (*Red.*) *a.* Make an infusion of cochineal in water of ammonia, then immerse the pieces therein, having previously soaked them for a few minutes in very weak aquafortis and water.

b. Boil the bones with 1 lb. of Brazil dust, in 1 gallon of water, for 3 hours, then add $\frac{1}{4}$ lb. of alum and boil for 1 hour more.

2. (*Black.*) *a.* Immerse the pieces in a weak solution of nitrate of silver, for a short time, then expose them to the sunlight.

b. Steep for 2 or 3 days, in a decoction made with 1 lb. of galls and 2 lbs. of logwood, then steep for a few hours in iron liquor, (acetate of iron.)

3. (*Green.*) *a.* Steep in a solution of verdigris to which a little aquafortis has been added.

b. Dissolve distilled verdigris in weak vinegar, and steep the pieces therein.

c. Steep in a solution of 2 parts of verdigris, and 1 of sal ammoniac. *Observe* not to use a metallic vessel for the above.

4. (*Purple.*) *a.* Steep in a weak solution of terchloride of gold.

b. Boil for 6 hours in a decoction of 1 lb. of logwood in $\frac{1}{2}$ gallon of water, adding more water, as it wastes by boiling, then add 2 oz. of alum, and boil for 1 hour more.

5. (*Yellow.*) *a.* Boil for 1 hour in a solution made with 1 pound of alum in 1 gallon of water, then take out the pieces and steep them in a decoction made with $\frac{1}{2}$ lb. of turmeric in 2 quarts of water; lastly, mix the two liquors and boil them therein for 1 hour.

b. Steep the pieces for 24 hours in a solution of sugar of lead, then take them out, and when dry, immerse them in a solution of chromate of potassa.

c. Dissolve as much of the best orpiment in water of ammonia or hartshorn, as it will take up, then steep the pieces therein for twenty-four hours; lastly, take them out and dry them, when they will turn yellow. *Remark.* By diluting the solution with water, any shade of yellow may be made.

6. (*Blue.*) *a.* Stain them green, then steep them in a hot and strong solution of pearlash.

b. Boil them in a strong decoction of logwood, and afterwards steep them in a solution of blue vitriol.

c. Steep them for a short time in a weak solution of sulphate of indigo, to which a little salt of tartar has been added; or, still better, boil them in a dyer's green indigo vat. *Remarks.* The bones of living animals may be dyed by mixing madder with their food. The bones of young pigeons may thus be tinged of a rose color in 24 hours, and of a deep scarlet in 3 days; but the bones of adult animals take a fortnight to acquire a rose color. The bones nearest the heart become tinged soonest. In the same way extract of logwood will tinge the bones of young pigeons purple. (Mr. Gibson.)

BONE GREASE. *Prep.* By bruising and boiling the refuse bones of the kitchen, and skimming the broth when cold, from $\frac{1}{4}$ (?) to $\frac{1}{3}$ of their

weight of good fat may be obtained, fit for culinary purposes when fresh, but always excellent for making soap and candles. (Proust.)

BONE GLUE. *Syn.* GELATINE. *Prep.* This is made by dissolving out the earth of bones, previously boiled for the grease, washing the remaining jelly with water, then boiling it with a little water, and forming it into cakes for sale. (SEE GLUE.)

BONE MANURE. For this purpose the bones are ground to a coarse powder in a mill, and sowed along with the seed in a drill. It is said that wheat thus treated yields 30 to 50 per cent. more in weight of straw and grain than by the common methods. It is usually applied to light or turnip soils, which it renders more than ordinarily productive. Bone manure is much used in the west of Yorkshire, Holderness, and Lincolnshire. The usual quantity per acre is 70 bushels, when used alone; but when mixed with ashes, as common manure of any sort, 30 bushels per acre is thought quite enough. It is applied at the same periods as other manure, and has been found in this way to remain 7 years in the ground. The rough part of this manure, after being 5 years in the ground, has been gathered off one field and thrown upon another of a different soil, and has proved, even then, good manure.

BONES, (IN COOKERY.) The bones of good meat form most excellent materials for making soups and gravies, as is well known to every good cook. In France, soup is extensively made by dissolving bruised bones in a steam heat of 2 or 3 days' continuance, and also by dissolving out the earthy part by digestion in weak muriatic acid, when a lump of gelatine is obtained, which after being well washed with water will dissolve by boiling, and is equal to isinglass for all the purposes of making soups and jellies. Proust has recommended the following process for making the best of bones, in hospitals, jails, and similar establishments:—Crush the bones small, then boil them for 15 minutes in a kettle of water, cool, and skim the fat off, which varies from $\frac{1}{8}$ to $\frac{1}{4}$ (?) of the weight of the bones employed, and when fresh is fit for all common purposes. The bones are then ground, and boiled in 8 to 10 times their weight of water, of which that already used must form a part, until $\frac{1}{2}$ is wasted, when a very nutritious jelly is obtained. A copper vessel should not be used, as the jelly acts upon this metal. An iron Papin's digester is the most suitable. The bones of boiled meat are nearly as productive as those of fresh meat, but roasted meat bones scarcely afford any jelly. (Dr. Young.) As boning meat before cooking is now a very general practice, a quantity of fresh bones may always be had.

BONE SHAVINGS. *Syn.* BONE DUST. BONE TURNINGS. These yield a beautiful jelly by boiling with water, nearly equal to that produced from hartshorn shavings, for which they are very frequently sold.

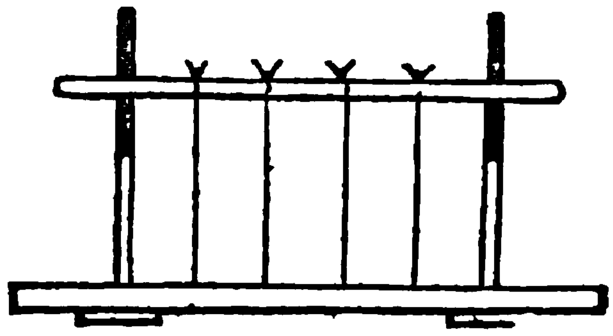
BOOKBINDING. The process of binding books may be divided into several distinct operations, which, in large establishments, are usually performed by different persons, such a method being found to produce greater expedition and better work, than when the whole is done by one person.

The sheets received from the hands of the printer are—

1. *Folded*, which is done correctly by observing the marks or catchwords at the bottom of the pages. As the sheets are folded they are laid upon each other in proper order, and are ready to undergo—

2. *The operation of beating.* This is performed by laying them upon a large stone, and striking them with a heavy smoothed-faced hammer, or by passing them through a rolling press. The former method is usually adopted in the small way, and the latter on the large scale.

3. *The sheets are next fastened to bands*, which is done by taking the folded sheets up one by one, and sewing them to pieces of cord, stretched in a little frame screwed or fastened to the counter or table, called the sewing-press. (See eng.) The



number of bands used, is generally 6 for a folio, 5 for a quarto, and so on proportionally, less than 4 seldom being employed even for small sizes. The ends of the cords being cut off to within about 2 inches of the back, the sheets are ready for—

4. *Glueing.* The back being knocked into shape with a hammer, and the sheets placed in the cutting press, which is then slightly screwed up, melted glue is thinly and evenly applied. After a short time the book is removed from the press, and the back properly adjusted with a hammer, when it is again put into the cutting press, where it is screwed up very tight, and is then ready for—

5. *Cutting.* The instrument employed for this purpose is of a peculiar shape, and called a plough or plough-knife.

6. *Affixing the boards. The bands*, are now scraped out fine at the ends, and the pasteboard to form the covers is fastened thereto, and is then properly adjusted, and shaped with a large pair of shears. The edges now undergo the operation of—

7. *Sprinkling*, or other adornment. The first is performed by a stiff brush of hog's bristles, dipped in the color; the brush being held in the one hand, and the hairs moved with the other.

8. *The external covering of leather, fancy cloth, or paper*, is now applied, having been previously well soaked in paste, to make it properly adhere. One or more of the blank leaves of the book are next pasted against the inside of the cover, to screen the ends that are turned over, when the book is finished; or for choice work, is handed to a "*finisher*" for—

9. *Lettering, gilding, &c.* Gold-leaf is applied by means of white of egg, the pattern being given by pressure with heated brass tools, having the design or letters on their surfaces. The whole is then glazed over and polished.

Remarks. The succession of some of the above operations sometimes varies with the workmen and

the nature of the binding. The above must therefore only be regarded as a short and general outline of the process. If the reader will accompany the perusal by an examination of a bound book, the whole will be rendered quite familiar.

The following varieties of binding may be noticed:

a. Boards. A book, loosely done up without cutting the edges, and covered with paper or cloth, is said to be in boards.

b. Cloth-binding. This style of binding is that in which the majority of works are now issued. It admits of great neatness and even beauty, and is very durable and cheap. *Proc.* The prepared cloth, cut by a pattern to the size suited to the volume, is passed rapidly through a rolling press, between engraved cylinders of hardened steel, which print the pattern in relief. Paste is now applied to the cloth, when it is placed over the volume, previously prepared to receive it. Books in cloth-binding are not commonly cut at the edges, unless highly finished.

c. Dutch binding. This species of binding is distinguished by the backs being of vellum.

d. French binding. This consists in pasting a piece of parchment over the back of the book, between each band, and pasting the ends upon the inside of each cover.

e. Half-binding. Books forwarded in boards, and finished with leather backs and corners, are called "*half-bound.*"

f. Hancock's patent binding. In this method the sheets are folded in double leaves, and being properly placed together and adjusted, the book is subjected to the action of a press, and a strong solution of Indian rubber is smeared over the back with the finger. The operation is repeated, as often as necessary, when fillets of cloth are cemented on with the varnish, and the book is ready to have the boards attached. Thus several of the common operations of binding are dispensed with. I willingly bear testimony to the strength and durability of this method, and the great convenience it affords in allowing the books to open perfectly flat upon a table, or to be distorted in any possible manner, without injury to their backs. It is the best way of binding books for travellers. I once had a large trunk of books, among which was one bound on Hancock's plan. All the rest were nearly torn to pieces by a few months' journey, but this one was uninjured.

g. Law binding. A strong method applied to law books.

h. Leather binding. *Proc.* Immerse the leather in water; after which wring it, and stretch it on a board; place the book with the boards extended thereon, and cut out the cover, allowing about half an inch larger than the book, to turn over the inside of the pasteboards. Pare the edges of the cover very thin all round on a marble slab, and paste it well; glue the back of the book, and spread the cover on the board.

Let the pasteboards be properly squared and even; put the book on the cover, which draw on very tight. Rub the cover smooth with a folding-stick, and turn it over on the inside of the pasteboards on the fore edge. The corners on the inside must be cut and neatly pressed down; tie a piece of thread round the book, between the boards and head-bands, draw up the leather on the back, if necessary, to cover the top of the head-bands; rub the back very smooth with a flat folding-stick, and place it at a distance from the fire to dry.

Rough calf must be damped on the grain side with a sponge and water before pasting and covering.

Russia leather must be well soaked in water fo an hour, taken out, well beaten, and rubbed; afte which the paste must be well worked into the flesl side before covering.

Morocco must be grained by rubbing it on a board, with the grain side inside, and after being pasted, left to soak for a quarter of an hour, and the cover then drawn on with a piece of woollen cloth to preserve the grain.

Roan may be either soaked in water or left to soak when pasted.

i. Italian binding. This is a common variety of binding employed in Italy, (hence its name,) in which the books are covered with a kind of thick coarse paper. In Italy it is called "*alla rustica.*"

k. Marble binding. Named from the design of the exterior.

l. Palmer's patent binding. This consists in applying small brass bars, linked together, to the back of the book, in such a manner that they make the different sections of the book, when open, parallel with each other, and thus admit of writing, without inconvenience, on the ruled lines near the back.

m. School binding. The following is a strong method for school books:—When the books have been cut, colored, and backed, cut off the part of the bands intended to be laced to the pasteboards, and glue on the back a piece of strong smooth linen cloth, which must reach within half an inch of the head and foot, turning on the sides about an inch; paste the boards on each side of the cloth, fixing them close in at the groove, and give the books a firm pressing in the standing-press till dry. Square the boards, glue the backs, and cover and finish in the usual manner.

This method will secure and give strength to the joints, so as effectually to prevent the leather from breaking, and require no more time than lacing in the bands. The edges may now be colored, sprinkled, or marbled, as required.

n. William's patent binding. This consists in placing a back, of a curved form, turned a little at the edges, and made of iron, copper, brass, wood, ivory, or any other material of sufficient firmness. This back is adjusted to the book before it is bound, in such a manner that it may just cover, but not press upon the edges, and is fastened on by enclosing it in vellum or ferret wrappers, which are pasted down upon the boards or drawn through them. The effect is, to make the book open evenly and freely, and to prevent it from spreading on either side.

BOOTS, TO CLEAN. To do this in the best style always use "boot-trees," employ but little blacking, and brush it off while damp. The dirt should, of course, be carefully brushed off before applying the blacking.

BOOTS AND SHOES, WATERPROOF COMPOSITION FOR. *Prep.* Boiled oil 1 pint; oil of turpentine, black rosin, and bees' wax, of each 3 oz. *Proc.* Melt the wax and rosin, then stir in the oil, remove the pot from the fire, and when it has cooled a little, add the turpentine.

II. Take 3 oz. of spermaceti, and melt it in a pipkin, or other earthen vessel, over a slow fire; add thereto 6 drachms of Indian rubber, cut into slices, and these will presently dissolve. Then add *seriatim* of tallow 8 oz.; hog's lard 2 oz.; amber varnish 4 oz. Mix, and it will be fit for use immediately. *App.* The boots or other material to be treated, are to receive two or three coats, with a common bladking brush, and a fine polish is the result.

BOOT-TOP LIQUID. *Prep.* I. Oxalic acid and white vitriol of each 1 oz.; water 1½ pints. *Proc.* Dissolve and apply with a sponge to the leather previously washed with water, then wash the composition off with water, and dry. This liquid is poisonous.

II. Mix in a vial, 1 drachm of oxymuriate of potass, with 2 oz. of distilled water; and when the salt is dissolved, add 2 oz. of muriatic acid. Then shake well together, mix in another vial 3 oz. of rectified spirit of wine with ½ an oz. of the essential oil of lemon, unite the contents of the two vials, and keep the liquid, thus prepared, closely corked for use. This liquid should be applied with a clean sponge, and dried in a gentle heat; after which, the boot-tops may be polished with a proper brush, so as to appear like new leather.

III. Sour milk 1 quart; gum arabic 1 oz.; juice of 2 lemons; white of 2 eggs; oil vitriol 2 oz. Mix.

IV. Sour milk 1 quart; butter of antimony, cream of tartar, tartaric acid, and burnt alum, of each 2 oz. Mix.

BORACIC ACID. *Syn.* SEDATIVE SALT. SED. SALT OF VITRIOL. SED. SALT OF HOMBERG. *Prep.* Dissolve borax in 4 times its weight of boiling water, then add sulphuric acid to the solution until it acquires a distinct acid reaction, (about ¼ the weight of the borax.) As the solution cools, crystals of boracic acid will be deposited. These crystals must be then placed on a filter, and washed with a little cold water. They may be still further purified by solution in boiling water and recrystallization.

Remarks. Even after this treatment, the crystals are apt to retain a little sulphuric acid or sulphate of soda, which can only be got rid of by heating them in a platinum crucible, before redissolving them and crystallizing the second time, as above described. When wanted perfectly pure for chemical analyses, this plan must be always adopted.

The boracic acid of commerce is extracted from the acid lagoons of Tuscany.

Prep. As thus obtained, this acid is soluble in 25 times its weight of cold, and 3 times its weight of boiling water. Very soluble in alcohol, which then burns with a bright green flame, offering a sure test of the presence of boracic acid. Odorless, and tastes bitter. Reddens litmus, but browns turmeric paper. It was once administered internally in large doses, (by Cullen,) but is now scarcely ever employed as a medicine.

BORATE. A compound, formed of the preceding acid and one of the bases.

Prop. The boracic acid has but a feeble affinity for the bases; most of the borates being decomposed by the stronger acids, the former being liberated in a free state. *Prep.* Many of them may be formed by digestion of the hydrate of the base in a solution of the acid, with the assistance of heat, or by double decomposition.

Tests. I. By digestion in slight excess of oil of vitriol, evaporating to dryness, powdering, and dissolving in alcohol, the latter will acquire the property of burning with a green flame. II. If to a strong and a hot solution of a borate, sulphuric acid be added in excess, crystals of boracic acid will form as the liquor cools.

BORATE OF MERCURY. *Prep.* I. Neutral borate of soda 265 grs.; calomel 222 grs.; grind together in a mortar, with a little water, then fill the mortar up with hot water; collect the red precipitate; wash and dry.

II. Add a solution of borax to a solution of quicksilver in nitric acid. Collect the precipitate as before. (White.)

BORATE OF SODA. I. (*Neutral borate.*) *Prep.* Saturate boracic acid in solution with carbonate of soda, at a boiling heat. (Berzelius.)

II. (*Biborate.*) This salt, often erroneously called borate and subborate, is the borax of commerce, and is a natural production. (See BORAX.)

BORAX. *Syn.* BIBORATE OF SODA. BORATE OF SODA. SUBBORATE OF SODA. REFINED BORAX. Crude borax is a natural production, and after being refined, forms a large portion of the borax of commerce. In its rough state it is called *crude borax, tincal, tincar,* &c. It is found crystallized on the edges and shallows of a brackish lake in Thibet, during the winter. It is also prepared by saturating the native boracic acid of Tuscany with soda. The market being literally overloaded with the former article, its price has fallen so low as to allow of its employment for this purpose with great advantage. A valuable paper on this subject, by M. Payen, appeared in the "Ann. de Chimie et de Phys." for July, 1841; and a translation of the same in "The Chemist," vol. ii. 368, to which the reader is referred for a complete account of this process.

The best Tuscany boracic acid contains only 50 per cent. of real boracic acid, and yields no more than 140 to 150 per cent. of good borax.

Prop., Use, &c. It is extensively employed as a flux for metals, for soldering, and in medicine. Internally it is diuretic, sedative, emmenagogue, and cooling, in doses of 15 to 40 grains; externally as a gargle for sore throat, and in powder as a detergent in aphthæ, and ulcerations of the mouth. Dissolved in rose-water, it is used as a cosmetic, and mixed with 8 times its weight of lard, forms a useful piles ointment.

Tests. These are the same as for the borates, which see. It reddens turmeric paper, and, before the blowpipe, fuses into glass, which may be tinged red by terchloride of gold, and blue by cobalt.

Pur. The purity and strength of borax are best ascertained by determining the quantity of sulphuric acid required to neutralize a given weight, as indicated by litmus paper. Common salt and alum are frequently mixed with borax to lower the value. The former may be detected by dissolving the borax in hot water, when a solution of lunar caustic will give a curdy white precipitate, soluble in ammonia; and the latter by water of ammonia, which will give a bulky white precipitate. The

former must be distinguished from the white pulverulent precipitate of borate of silver, which will be thrown down from pure borax.

BORAX, GLASS OF. *Prep.* Dry borax with a gentle heat, breaking down the froth as it rises, then melt it by increasing the heat until it runs into a glass. *Use.* In soldering, and as a blowpipe flux.

BORO-FLUORIDE OF HYDROGEN.—*Prep.* Pass fluoboric acid gas through water, and afterwards carefully concentrate the solution; cool and separate the crystalline powder from the solution, which is the boro-fluoride of hydrogen. *Prop., &c.* With most of the protoxides it interchanges bases, and metallic boro-fluorides result.

BORO-FLUORIDE OF BARIUM. *Prep.* Add carbonate of baryta to boro-fluoride of hydrogen, until it ceases to be dissolved; evaporate to the consistence of a sirup, when crystals will form. *Remarks.* The boro-fluoride of calcium, magnesium, and lead, may be formed in a similar way.

BORO-FLUORIDE OF POTASSIUM.—*Prep.* Drop boro-fluoride of hydrogen into a solution of carbonate of potassa, collect the white powder that falls, and wash it with cold water.

BORO-FLUORIDE OF SODIUM. *Prep.* Dissolve fluoride of sodium in boro-fluoride of hydrogen, and crystallize. *Remarks.* Boro-fluoride of lithium may also be formed in a similar way.

BORON. The base of boracic acid, discovered by Sir H. Davy, in 1807, by means of the galvanic battery of the Royal Institute.

Prep. Potassium, and perfectly dry boracic acid, or still better, boro-fluate of potassa, intimately mixed together, are to be placed in an adopter, or glass tube, and submitted to a low red heat. When cool, remove the loose cork that fastened its mouth, and pour in successive portions of hot water, until the whole matter is detached and dissolved. Collect the liquid and allow it to settle, then wash the precipitate, first with a solution of sal ammoniac, and finally, with alcohol; next dry the boron in a capsule, and put it into a well-stopped vial.

Prop., &c. A solid, tasteless, and inodorous powder, of grayish-brown color. With sulphur it unites at high temperatures, forming sulphurets; and when placed in chlorine gas it spontaneously inflames, and a gaseous chloride is produced. This gas may also be made by exposing calcined borax and charcoal at a red heat to the action of dry chlorine.

BOTTLE, RED. *Syn.* TAYLOR'S RED BOTTLE. WHITWORTH DOCTOR'S RED BOTTLE. *Prep.* British brandy 1 quart; powdered cochineal ½ oz.; oil of origanum 10 drops. Digest for 24 hours and filter.

BOUGIE. *Syn.* CANDELA. CANDELA CEREA. CANDELULA. VIRGA CEREA. CEREA. CEREOLA. CEREUS. CEREOLUS. A long slender instrument, introduced into the urethra, œsophagus, or rectum, to overcome strictures of those canals. The word bougie is the French for a wax candle.

Prep. I. Add 3 parts of boiled linseed oil to 1 part of melted amber, and when mixed add 1 part of oil of turpentine; spread the mixture at 3 successive intervals upon loose spun silk cord or web, dry in a heat of 150°, and repeat the process until the instrument has acquired the proper size, then polish, first with pumice-stone, and afterwards with tripoli and oil.

Remarks. The above is the original receipt of the French professor Pickel, and is still generally used, slightly modified, on the continent.

II. Add to the oil and amber melted together, as last, caoutchouc in the proportion of $\frac{1}{16}$ of the weight of the oil employed; when dissolved, remove the vessel from the fire and proceed as before.

Remarks. This is the plan usually adopted at Paris, and for the best elastic bougies this process usually occupies from 6 to 8 weeks. When the bougie is wanted to be hollow, a piece of polished metallic wire is introduced into the axis of the silk, or tinfoil is rolled round the wire and the composition applied as before. When dry and hard the wire is withdrawn.

III. (*Caoutchouc, or elastic gum bougies.*) *a. In France* these are made by applying a solution of Indian rubber in ether, to the silk or foil prepared as above.

b. In England, where ether is expensive, naphtha is employed, or slips of Indian rubber previously boiled in water, or that have had their edges softened with ether, are wound round the wire or foil, and kept in their place by a piece of tape applied over them, as in making elastic tubes. They are afterwards carefully smoothed off.

IV. A common kind of bougie is made by dipping pieces of catgut or soft linen into lead plaster, melted, and rolling it while yet warm upon a slab. *Very inferior.*

V. (*White.*) *Prep.* Yellow wax 1 lb.; spermaceti 1 oz.; finely-powdered sugar of lead ¼ oz.; melt and spread upon slips of old linen, then roll them up while warm with the spread side outwards.

VI. (*Bell's.*) Lead plaster 1 lb.; yellow wax 8 oz.; olive oil 2 oz.; *as last. Very inferior.*

BOUILLI. (French for boiled meat.) This name has been applied by cooks to several dishes of boiled meat, as a refinement on the plain English. Thus "beef bouilli, beef in bouilli, &c.," means, stewed or boiled beef, &c. As, however, the name is à la français, so must be the accompaniments, which generally consist of herbs and vegetable seasoning in greater quantity and variety than is usually deemed essential to a plain-spoken piece of boiled or stewed meat!

BOULES DE NANCY. Equal parts of iron filings and red tartar, made up into balls with spirit. *Use.* As a tonic dissolved in hot water.

BOUQUET DE LA REINE. *Prep.* I. Essence of bergamotte 1 drachm; English oil of lavender 23 drops; oil of cloves and aromatic vinegar, of each 8 drops; essence of musk 10 drops; alcohol ½ oz. Mix.

II. Oils of bergamotte and lavender 30 drops each; neroli 15 drops; oils of verbena and cloves, of each 5 drops. Essences of musk, ambergris, and jasmin, of each ½ drachm; rectified spirit of wine (strongest) 1 oz. Mix.

BOX WOOD MAHOGANY. *Prep.* Warm the wood by the fire, then wash it over with aquafortis, let it stand 24 hours to dry, and polish it with linseed oil reddened with alkanet root, or give it a coat of varnish, made by dissolving aloes and annotto in spirit of wine.

BOYLE'S FUMING LIQUOR. Hydrosulphuret of ammonia is usually employed and sold for this article, but the liquor prepared by Boyle's process contains an excess of sulphur. (Gay Lussac.) The properties of both are however the same.

Prep. Mix 4 parts of fresh slaked lime; 2 of sal ammoniac, and 1 of sulphur, then submit the mixture to distillation.

BRA GRAS. Tar, black rosin, and the dregs of strained rosin, melted together.

BRAIN CAKES. *Prep.* Clean, wash, blanch, and soak the brains, then beat them up with a little white pepper and salt, a sage-leaf or two, scalded and finely chopped, and the yelk of an egg; make them into small cakes or fritters, and fry them.

BRAN. The husk of wheat which immediately covers the grain, and which is left in the bolting machine. *Use.* It is largely employed by the calico printers, when diffused through hot water, to remove the coloring matter from those parts of their goods which are not mordanted. A handful mixed with a pail of warm water, forms an excellent emollient foot-bath. Infused in water, (*bran tea,*) and sweetened, it forms a popular demulcent, much used in coughs and hoarseness, and, taken in quantity, proves gently laxative. It also forms an excellent manure, and, from containing the ammoniaco-magnesian phosphate, is especially adapted for potatoes. It is frequently mixed with flour and made into bread; by the poorer orders.

BRANDY. *Syn.* Eau de Vie. Aqua Vitæ. Spiritus Gallicus. Brandy-wine. The spirituous liquor obtained by the distillation of wine. When first distilled it is colorless, and only acquires a yellowish tint from the wood of the casks, in which state it is known and sold as pale or white brandy. The deep color that it usually possesses, is imparted to it by adding a little spirit coloring, (burnt sugar or caramel,) and occasionally a little red sanders wood as well, and is intended to imitate the appearance acquired by brandy from great age, when kept in wood. The natural color, however, which the spirit receives from the cask, no matter how long it may have been in it, never exceeds an amber tint, about the common color of pale Jamaica rum; but the public taste has been gradually vitiated in this respect, until only a spirit of a lively and full "*brandy color*" (unless for a pale brandy) will sell.

The brandies most esteemed in England are imported from France, and are those of Cognac and Armagnac, the preference being generally given to the former. The brandies of Rochelle and Bordeaux may be reckoned next in quality, while those obtained from Portugal, Spain, and Italy are very inferior.

The constituents of brandy are alcohol and water, and small quantities of volatile oil, acetic acid, acetic ether, œnanthic ether, coloring matter, and tannin. It is from the presence of the last six of these substances that the spirit derives its distinguishing smell and flavor. The quantity of alcohol present in brandy varies from 48 to 55 per cent. When first imported, it is generally 1 or 2 overproof, but by age its strength is lessened, and by the time it is usually taken from the bond store for sale, seldom exceeds 3 or 4 underproof. From considerable personal acquaintance with the cognac trade, I feel confidence in asserting, that brandies of the best quality seldom exceed proof, and are generally below it, and that it is a common practice in France to add spirit of wine and coloring to raise the strength to any given point desired by the English purchaser, and to charge the same in the invoice; or where the purchaser is not *well acquainted with the subject*, and desires a strong spirit at a low rate, to sell him brandy so mixed as genuine. The very finest brandies average from 5 to 10 u. p., and never exceed about 2 u. p.; they then contain more than ½ their weight of water, and from their boiling point being higher, they come over more highly charged with essential oil, and other volatile and fragrant principles of the grape, and thus possess in a greater degree that peculiar aroma and flavor for which they are so much esteemed. French brandy or wine, distilled at a low temperature in a water bath, yields a very pure and scarcely flavored spirit.

The quality of the brandy imported from France varies considerably from that which is drunk on the continent, principally from its being *prepared*, or, as it is technically termed, "*made up,*" for the London market, which means lowering it by the addition of spirit, coloring, &c. above described. The common strength at which foreign brandy is sold in England is about 11 or 12 u. p., and below 17 u. p. it becomes seizable by the excise. The strength at which it is sold and permitted in trade, is generally 10 u. p., to which it is reduced by adding water, and never less than 12 u. p., unless it be specially agreed upon. In large quantities and from bond, of course the strength depends much upon the age and quality of the spirit. A fine old brandy being, perhaps, 8 or 10 *u. p.*, while one of the last year's vintage of a commoner quality may be as strong as 2 or 1 *u. p.* But these distinctions are familiar to every experienced brandy dealer.

In France there are several varieties of this spirit distilled, which are known by names descriptive both of their quality and source. The "*eau de vie supérieure,*" or *cognac brandy*, is generally obtained from pale white wines, by careful distillation, and is remarkable for its superior flavor. When kept in glass or stone bottles, it is called white cognac brandy, and the same term is also generally applied when it has been kept in casks, but has not been artificially colored; in the latter case, however, it generally acquires a pale amber tint.

The "*eau de vie ordinaire,*" or *common brandy*, is distilled from high-colored white or red wines, and has generally a sp. gr. of 0·948, and varies from 22 to 27 u. p.

The "*eau de vie de marc*" is obtained from the lees of vinegar and other wines, the marc or cake of grapes from which the juice has been pressed, and the commonest red wines, fermented and distilled together by a quick fire, to drive over as much essential oil and flavoring as possible.

The "*eau de vie seconde*" is the weak spirit that passes over after the stronger spirit has been drawn off, and the receiver changed. *It is used* for common drinking, or mixed with other brandy.

The "*eau de vie à preuve d'Hollande*" is brandy about 19° Baume, or sp. gr. ·9420, the common strength at which it is retailed in France, and will stand the "*proof*" or "*bead*"

The "*eau de vie à preuve d'huile*" is the strongest brandy usually drunk; it is about 23° Baume, or sp. gr. ·918; pure olive oil will just sink in it; hence the above term.

The "*eau de vie fort*" is usually prepared by the redistillation of common brandy, keeping the first portion separate. It answers to our spirit of wine. It is made of 12 different strengths, distinguished by names, exhibiting the quantity of water required to reduce the sample to the "*preuve d'Hollande.*" The weakest is called cinq-six, or $\frac{5}{6}$, and the strongest trois-neuf, or $\frac{3}{9}$, the difference between the numerator and the denominator being the quantity of water the 3 parts of the former will take to reduce it to the "*preuve*," when it would make 9 parts. Its sp. gr. is about ·839.

The *esprit de vin* is brandy or spirit rectified to 0·890 and upwards.

The general method of distilling brandy in France differs in no important particular from that practised in England, for grain or molasses spirit. Neither are the French workmen more skilful nor more cleanly in their operations than the English. It is the materials alone that, in this case, conduce to the superiority of the product. The quality of the brandy varies with that of the wine from which it has been distilled. Every soil, every climate, every kind of grape, produces a wine possessing some peculiarity confined to itself, and this wine on distillation produces a spirit possessing like distinctions. A large quantity of brandy is prepared in France soon after the vintage, as the juice of the poorer grapes that is unfit for wine is fermented and at once distilled. It is a general rule, in France, to distil only such wines as are unsaleable, as the profits on the wine, sold as such, are much greater than when it is converted into brandy.

The Strength of Brandy may be ascertained in the same way as alcohol, for which purpose Sike's hydrometer is used in England. In France, from the value of spirit being less, it is frequently tested by simpler methods, though great accuracy obtains, in this particular, where necessary.

Pur. Very little perfectly pure French brandy is obtained by the small consumer in England, as it is not only generally lowered a little by the wholesale dealer, but undergoes a like process at the hands of the retailer. The safest method is either to procure it direct from the bond store, without its even entering a private cellar, or to buy of some known respectable party, and to pay a price that will offer no inducement to dishonesty. If this be not done, by all means buy British brandy, which is now made of excellent quality by many of the leading houses, as *Betts*, *Bretts*, *Booth*, and *Grimble*. From the two former a single sealed bottle may be procured at the same price as by the gallon.

The importation of foreign brandy for home consumption amounts to about 1,400,000 gallons a year.

BRANDY, (REDUCED.) I. To 20 gallons of Cognac brandy add 5 gallons of the best British brandy.

II. To 72 gallons of full-flavored French brandy, add 10 gallons of spirit of wine, (58 *o. p.*,) 8 gallons of water, and 1 pint of good coloring. Rummage well up and let it stand until the next day. *Remarks.* The above reduction is generally adopted in trade, and is known by the name of "*improving*." But such is the poverty of the palate of the English brandy drinker, that the adulteration is often not suspected, even when it is carried to double the extent of the above, which is generally exceeded in the hands of the retailer. So long, however, as the foreign spirit constitutes about half of the mixture, and was at first of decent quality and age, the infatuated Englishman smacks his lips, and cunningly holding up his glass between the light and his eye, exclaims, "*Ah! this is a drop of the real.*"

BRANDY, (BRITISH.) *Syn.* British Cognac. Imitation Cognac, &c. From the heavy duty levied on French brandy imported into England for home consumption, it has become a desideratum with the distiller (rectifier) to produce an English spirit of a similar description. For some time the attempt proved quite unsuccessful, but of late years much capital and talent have been embarked in the pursuit, and the result has proved very satisfactory. An article of British manufacture may now be purchased, at a very reasonable rate, of really respectable quality, and possessing much of the flavor and aroma of foreign brandy, while, as a beverage, it is equally wholesome. Much of the British brandy, however, that is commonly met with, is of such a wretched quality as to be quite undeserving of the name, which is evidence of the fact, that much skill and experience is required to ensure success in its manufacture. For a long time this liquor was distilled from spoilt wine and dregs of wine, both British and foreign, mixed with beer bottoms and similar articles; and when, instead of these, corn, malt, and molasses spirit were employed, it was considered as an unpardonable and wicked misuse of those articles. Modern experience has proved, however, that perfectly pure and tasteless malt spirit is the best article to form into an imitation brandy.

The following formulæ, by skilful management, will produce very good brandy, but it must be recollected that much depends on the quality of the materials employed, as well as on the operator. As the strength and quality of the ingredients, and the methods of manipulation vary, so will the result; much must therefore be left to the judgment and discretion of the artist. It offers a profitable pursuit to the ingenious and industrious chemist and rectifier.

Prep. I. Take 12 gallons of the finest flavorless malt spirit at proof, (or if of a different strength a proportionate quantity;) add thereto 5 gallons of water, $\frac{1}{2}$ lb. of the best crude red tartar or winestone, previously dissolved in 1 gallon of boiling water; $\frac{1}{4}$ pint of acetic ether; 2 quarts of good French wine vinegar; 7 lbs. of bruised French plums, and 1 or 2 gallons of wine bottoms or flavor stuff from Cognac, mix them in a fresh-emptied sherry cask, and let them stand together for 14 days, frequently rummaging up the liquor with a stick; next draw over 15 gallons of the mixture from a still furnished with an agitator. Put the rectified spirit into a clean, fresh-emptied Cognac brandy cask, and add thereto $\frac{1}{2}$ pint of tincture of catechu, 1 lb. of fresh and clean oak shavings, and about a pint of good spirit coloring. Bung close, and agitate occasionally for a few days. *Remarks.* Age improves the above article, and renders it

(provided the process be well managed) of a very superior quality. The above receipt yields 15 gallons of brandy 17 *u. p.* The following forms may also be recommended:—

II. Perfectly pure spirit, pf. 99 gallons; red tartar, dissolved, 7 lbs.; acetic ether 3 lbs.; wine vinegar 3 gallons; bruised raisins, or French plums, 7 lbs.; bitter almonds, bruised, 1 oz.; water sufficient. Dissolve the tartar in the water, then add the other ingredients, macerate as before, and draw over 120 gallons; lastly, add a few lbs. of oak shavings, 1 lb. of powdered catechu made into a paste with water and burnt-sugar coloring as before. *Remarks.* This yields 120 gallons of spirit fully 17 *u. p.*

III. Clean spirit 17 *u. p.*, 100 gallons; nitric ether 2 quarts; cassia buds, ground, 4 oz.; bitter almond meal 2 oz.; orris root, sliced, 6 oz.; powdered cloves 1 oz.; capsicum 1½ oz.; good vinegar 2 gallons; brandy coloring 1 quart; powdered catechu 1 lb.; full-flavored Jamaica rum 2 gallons. Mix well in an empty Cognac cask, and let them macerate for a fortnight, occasionally stirring. *Remarks.* The proportion of the ingredients may be varied by the skilful brewer, as much depends on their respective strengths.

IV. Good plain malt spirit, 17 *u.p.*, 100 gallons; finely-powdered catechu 12 oz.; tincture of vanilla 4 oz.; burnt-sugar coloring 1 quart; good rum 3 gallons, or more; acetic or nitric ether 2 quarts. Mix well.

V. Clean spirit, 17 *u.p.*, 89 gallons; high-flavored cognac 10 gallons; oil of cassia 1½ drachms; oil of bitter almonds, essential, ½ a drachm; powdered catechu 10 oz.; cream of tartar, dissolved, 16 oz.; Beaufoy's concentrated acetic acid 3 lbs.; sugar coloring 1 quart, or more; good rum 1 gallon. Put the whole into a fresh emptied brandy piece, and let them remain a week together, with occasional agitation, then let them stand to settle. If this mixture be distilled, the French brandy, rum, coloring, and catechu, should not be added till afterwards.

VI. To colored plain spirit at 17 *u.p.*, add a little tincture of catechu, and a sufficient quantity of essential oil, distilled from wine lees, to give it a proper flavor. This oil is obtained by distillation from the wine lees, either dried and made up into cakes, or in their wet state mixed with about 7 times their weight of water. It should be dissolved in alcohol, and kept in this state, as it is apt to lose its flavor. *Remarks.* When this process is well managed a very capital article results, but it requires considerable address to conduct it well. The spirit produced by this plan is better for distillation. The brandy from any part of the world may thus be imitated, by distilling the oil from the lees of the wines produced in the particular district. This is the only method of producing an exact imitation. A pound each of finely-powdered charcoal and ground rice has been recommended to be digested in a gallon of spirit for a fortnight. Where black tea is cheap, as in America, it is very commonly employed to impart the roughness and flavor of brandy to colored spirits.

BRANDY, CHERRY. *Prep.* I. To every gallon of brandy put an equal measure of cherries, bruised between the fingers; steep for 3 days, then express the liquor; add 2 lbs. of lump sugar, and strain for use.

II. To the above add 1 quart of raspberries, and ½ a pint of orange-flower water. *** Quality very fine.

III. Treacle 1 cwt.; spirit (45 u.p.) 41 gallons; bruised bitter almonds (more or less, to taste) 5 oz.; cloves 1 oz.; cassia 2 oz. Put the ingredients into a large cask, well mix and let them lie a month, occasionally stirring.

Remarks. Equal parts of fully ripe Morello and black cherries produce the richest cordial.

BRANDY, CARAWAY. *Prep.* I. Steep 4 oz. of bruised caraway seeds and 2 lbs. of sugar in 1 gallon of British brandy, for a fortnight.

II. Sugar 1 lb.; caraways 1 oz.; 3 bitter almonds; spirits of wine and water, of each 1 quart; (or spirit 22 u.p. ½ a gallon.) Macerate as above.

BRANDY, DANTZIC. This is distilled from rye, ground with the root of calamus aromaticus. It has a mixed flavor of orrice and cinnamon.

BRANDY, LEMON. *Prep.* I. Steep ¼ lb. of fresh lemon peel and ½ a dozen lemons, cut in slices, in 1 gallon of brandy, for a week, then add 1 lb. of lump sugar.

II. Proof spirit 7 gallons; essence of lemon 3 drachms; sugar 5 lbs.; tartaric acid 1 oz., dissolved in water 2 gallons; coloring q. s. Mix, and rummage repeatedly for 14 days. *Remarks.* Sometimes milk is added to the above, in the proportion of 1 quart (boiling hot) to every gallon.

BRANDY, MALT. Malt spirit, flavored with sweet spirits of nitre and terra Japonica, and colored with treacle, or spirit coloring. (See BRIT BRANDY.)

BRANDY, ORANGE. This may be made in a similar way to lemon brandy.

BRANDY, PEACH. *Prep.* I. From peaches, by fermentation and distillation. Much used in the United States, where peaches are very cheap.

II. Bruise the peaches, then steep them in twice their weight of British brandy, or malt spirit; lastly, express the liquor.

III. Bitter almonds (bruised) 2 oz.; proof spirit (light) 10 gallons; water 3 gallons; sugar 5 or 6 lbs.; orange-flower water ½ a pint. Mix, and macerate for 14 days.

*** Color with brandy coloring, if *required* darker.

BRANDY, RASPBERRY. *Prep.* I. Pour as much brandy over raspberries as will just cover them; let it stand for 24 hours, then drain it off, and replace it with a like quantity of fresh spirit; after 24 hours more, drain this off and replace it with water; lastly, drain well, and press the raspberries quite dry. Next add sugar to the mixed liquors, in the proportion of 2 lbs. to every gallon, along with a ¼ of a pint of orange-flower water.

II. Mix equal parts of mashed raspberries and brandy together, let them stand for 24 hours, then press out the liquor. Sweeten as above, and add a little cinnamon and cloves, if agreeable; lastly, strain.

BRASS. An alloy of copper and zinc.

Hist. and Prep. Brass was formerly manufactured by cementing granulated copper, or copper clippings, with calcined calamine and charcoal, in crucibles, exposed to a bright heat. The alloy

was found in lumps at the bottom of the crucible on cooling. These were remelted and cast into ingots. At the present day, brass is generally made by direct union of the metals. This process requires much care, owing to the different degrees of fusibility of copper and zinc. The proper quantity of zinc is first melted, and slips of copper plunged into it, which are rapidly dissolved, as it were, and the addition is continued until an alloy is formed, somewhat difficult of fusion, when the remainder of the copper is added. The brass thus formed is broken into pieces, and remelted under charcoal, and a proper addition of either zinc or copper made, to bring it up to the color and quality desired. It is next cast into plates, or other forms, in moulds of granite. When submitted to the rolling-press for reduction to *thin* plates, it requires to undergo the operation of annealing several times.

Prep. I. (*Fine Brass.*) 2 parts of copper to 1 part of zinc. *Remarks.* This is nearly 1 equivalent each of copper and zinc, if the equivalent of the former metal be taken at 63·2; or 2 equivalents of copper to 1 equivalent of zinc, if it be taken, with Liebig and Berzelius, at 31·6.

II. Copper 4 parts, zinc 1 part. An excellent and very useful brass.

III. (*Gold-colored Brass.*) *Syn.* RED BRASS. DUTCH GOLD. TOMBAC. SIMILOR. PRINCE'S METAL. PINCHBECK, &c.

a. Copper and zinc, equal parts.

b. Copper 2 parts; zinc 1 or 1½ parts. This is Manheim gold.

c. Copper 3 to 5½ parts; zinc 1 part. Deep colored.

Remarks. The proportion of zinc in this alloy is altered to suit the color and other properties to the purposes for which it is intended, and often varies from ⅓ to ½, or ⅙ of the weight of the alloy. At the celebrated works of Hegermühl, near Potsdam, the proportions are 11 parts of copper to *two* of zinc, which produces a metal which is afterwards rolled into sheets for the purpose of making Dutch leaf-gold.

BRASS, BUTTON. (*Best.*) I. Copper 8 parts; zinc 5 parts, as above.

II. (*Common.*) Copper 50 parts; zinc 40 parts; tin 4 parts; lead 6 parts.

BRASS, FOR SOLDER. *Syn.* HARD SOLDER. I. 12 parts of brass; 6 parts of zinc, and 1 of tin, melted together.

II. 2 parts of brass, and 1 of zinc.

III. (*Very strong.*) 3 parts of brass, and 1 of zinc.

BRASS, TURNER'S. 98 parts of brass, and 2 of lead. *Remarks.* The addition of lead improves the brass for the uses of the turner, but lessens its malleability.

BRASS, CLEANING OF. Brass and copper are best cleaned with sweet oil and tripoli, powdered bath-brick, rotten-stone, or red brick-dust, rubbed on with flannel and polished with leather. A strong solution of oxalic acid in water gives brass a fine color. Vitriol and spirits of salts make brass and copper very bright, but they very soon tarnish, and consequently require more frequent cleaning. A strong lye of roche-alum and water will also improve brass.

Brass inlaid work may be cleaned as follows:—Mix tripoli and linseed oil, and dip into it a rubber of hat, with which polish the work. If the wood be ebony or rosewood, polish it with a little finely-powdered elder-ashes; or make a paste of rotten-stone, a little starch, sweet-oil, and oxalic acid, mixed with water. The ornaments of a French clock are, however, best cleaned with bread-crumb, carefully rubbed, so as not to spoil the woodwork. Ormolu candlesticks, lamps, and branches, may be cleaned with soap and water. They will bear more cleaning than lacquered articles, which are spoiled by frequent rubbing, or by acids, or strong alkalis.

BRASS COATING. I. Brass plates and rods may be covered with a superficial coating of brass, by exposing them in a heated state to the fumes of melted zinc, at a high temperature. *Use.* For rolling into thin plates, or drawing into wire. The celebrated spurious gold wire of Lyons is thus made.

II. Vessels of copper may be coated with brass, internally, by filling them with water strongly acidulated with muriatic acid, adding some amalgam of zinc and cream of tartar, and then boiling for a short time.

BRASS-COLORED PIGMENT. *Syn.* BRASS BRONZE. *Prep.* I. (*Red.*) Grind copper filings, or precipitated powder of copper, with a little red ochre.

II. (*Yellow or gold-colored.*) Gold-colored brass, or Dutch leaf reduced to a very fine powder.

Remarks. Both these powders are mixed up with varnish, and used as a paint. No more should be mixed at a time than wanted for immediate use. They are also used by dusting them over any surface, previously covered with varnish to make them adhere. (See OXIDE OF COPPER.)

BRASS-COLORED VARNISH. *Prep.* Dissolve 1 oz. each of pale shell lac and gum sandarach, in ½ a pint of rectified spirit of wine.

Use. To mix up the preceding powders.

BRASS, PASTE FOR CLEANING. *Prep.* I. Soft soap 2 oz., rotten-stone 4 oz.; beat them to a paste.

II. Rotten-stone made into a paste with sweet oil.

III. Rotten-stone 4 oz.; oxalic acid 1 oz.; sweet oil 1½ oz.; turpentine enough to make a paste.

Use. To clean brass. The first and last are best applied with a little water. The second, with a little spirits of turpentine, or sweet oil. Both require friction with soft leather.

BRASS ORNAMENTS, PRESERVATION OF. Brass ornaments, when not gilt or lacquered, may be cleansed, and a fine color given to them by two simple processes. The first is to beat sal ammoniac into a fine powder, then to moisten it with soft water, rubbing it on the ornaments, which must be afterwards rubbed dry with bran and whiting. The second is to wash the brass-work with roche alum boiled to a strong lye, in the proportion of an ounce to a pint; when dry, it must be rubbed with fine tripoli. Either of these processes will give to brass the brilliancy of gold.

BRASS STAIN. I. Cut sheet-brass into small pieces, and expose it to a strong heat for 2 or 3 days, then powder it, and again expose it for several days to a like heat; again powder and sift,

and expose it a third time to heat, testing it occasionally, to see if it be properly burnt. When this is the case, a little of it fused with glass will make the latter swell and froth up.

Uses, &c It imparts to glass a green tint, passing into torquoise.

II. Calcine equal parts of plate-brass and sulphur, stratified together in a crucible, until they become friable; then powder and expose them again, as last.

Use. Imparts a calcedony red or yellow tinge to glass by fusion, according to the mode of using it.

BRAWN, CHOICE. When young, the horny parts feel moderately tender; if the rind be hard, it is old.

BRAWN, MOCK. *Prep.* Take the head and belly piece of a young porker, well saltpetred; split the head and boil it; take out the bones and cut it to pieces; then take four ox-feet boiled tender, and cut them in thin pieces; lay them in the belly piece, with the head cut small; roll it up tight with sheet tin, and boil it four or five hours. When it comes out, set it up on one end, put a trencher on it within the tin, press it down with a large weight, and let it stand all night. The next morning take it out of the tin, and bind it with a fillet, put it into cold salt and water, and it will be fit for use; it will keep a long time, if fresh salt and water are put into it every four days.

BRAZIL WOOD. *Syn.* Sapan Wood. Saint Martha Wood. Fernambuca. This wood is much used in dyeing. A decoction is made by boiling for some hours in hard spring water, and this is generally kept for some time, or until it undergoes a species of fermentation, as it is thus found to yield more permanent and beautiful colors than when employed quite new. *Use.* To dye *red.*

BRAZIL WOOD DYE. I. (*For cotton and linen.*) *a.* First boil the goods in a bath of sumach, next work them through a weak mordant of solution of tin, and then run them through the Brazil bath, lukewarm. This gives a bright red.

b. First alum the goods and rinse them, then give them a mordant of solution of tin, rinse again, and turn them through the dye-bath. This gives a rose color.

Remarks. The shades of this dye may be varied by the strength of the bath, mordant, &c. A little alum added to the Brazil-bath, gives a purple tint. 1 lb. of Brazil wood, ½ oz. of alum, and 2 oz. of tartar will dye 20 to 25 lbs. of cotton.

II. (*For silk.*) The silk, after being well alumed in the same way as wool, but at a lower temperature, is rinsed, and passed through the decoction of Brazil, just lukewarm.

Remarks. By adding a little alkali to the bath, or by passing the silk through a water holding a little alkali in solution, after it is dyed, will produce what is called the false crimson. When wanted of a very deep crimson, a little logwood is added to the Brazil-bath. In this way any shade of color may be produced.

III. (*For wool.*) Boil the wool in water holding in solution 5 parts of alum and 1 of tartar, for 1 hour; then let it lie in the cold liquor for several days, frequently moving it about; lastly, boil it in a decoction of Brazil for ½ an hour.

BRAZILINE. *Syn.* Breziline. The coloring principle of Brazil wood, obtained by Chevreul in small orange-colored needles. It is soluble in both water and alcohol; alkalis turn it violet, acids yellow. With alum it dyes red.

BRAZING. The operation of uniting the edges of pieces of copper, brass, iron, &c., by means of hard solder.

Proc. The edges, after being filed quite clean, are covered with a mixture of hard solder and powdered borax, made into a paste with water. The whole is then allowed to dry, and afterwards exposed in a clear fire to a heat sufficient to melt the solder.

Remarks. In some cases a little silver is added to the solder, when it receives the name of "*silver solder.*"

BREAD. *Principles of bread-making, &c.* This most important article of food is made of the flour of different grains, but only those that contain gluten admit of conversion into light spongy bread. Hence it is that wheat flour is best calculated for this purpose. When flour is made into a stiff paste or dough with water, and rolled into cakes and baked, it forms biscuits, or unleavened bread, which was once the only description known. When the dough, previously to baking, is left for some time in a moderately warm place, varying from 80° to 120°, a state of fermentation comes on, formerly called the panary fermentation, but which is, in reality, the sugar of the flour gradually undergoing the process of conversion into alcohol, and resembles in every respect the same change which takes place in the manufacture of wine, beer, &c. During this process, a large quantity of carbonic acid gas is liberated, and the toughness of the dough preventing its escape, the whole mass becomes puffed up and spongy, and a light porous paste is formed, ready for baking into bread. The natural process of fermenting the dough just described, is, however, subject to much uncertainty, and is inconvenient from the time it occupies to complete it, and the tendency the dough has to run into the acetous fermentation, when it acquires a sour and disagreeable taste, and is rendered less nutritious and easy of digestion. This has led to the use of a *ferment*, which at once excites a proper state of fermentation throughout the mass, and speedily renders it light and spongy. *Leaven* or *dough*, already in a state of fermentation, was originally employed for this purpose, and the bread so made was hence called *leavened bread.* But this has been wholly superseded by barm or yeast. Thus it will be seen that all that is essential to make a loaf of bread, is to add a proper quantity of yeast to the dough, and to allow it to remain for a short time in a warm place, until it rises or becomes spongy, when it must be subjected to the operation of baking. If the process be well managed, and the flour be good, bread of superior quality will be produced.

Process of making bread. In preparing his dough, the modern baker takes a part of the water needed for the batch, and having warmed it to a temperature of about 80° or 90°, dissolves his salt therein, and then adds the yeast and a portion of the flour. These he works up into a dough, which he sets aside in a warm place usually provided for

the purpose, and called the "*kneading trough*," where it soon begins to ferment and swell up. This process is called "*setting the sponge*," and according to the proportion the water in it bears to the whole quantity that is to be used, it receives the name of "*whole*," "*half*," or "*quarter sponge*." The evolution of carbonic acid in the process of fermentation, causes the sponge to heave and swell, and when the surface bursts, it subsides, and then swells again and again in a similar manner. This action would go on for some time, if not interfered with; but the baker is careful to stop it before it has communicated a sourness to the mass. After the *first*, or at the *furthest*, after the second or *third* "*dropping of the sponge*," he adds the remaining quantity of flour, water, and salt, necessary to form the batch. These he incorporates by long and laborious kneadings, until the entire mass acquires uniformity, and is sufficiently tough and elastic to bear the pressure of the hand without adhering to it. The dough is now left to itself for a few hours, during which time fermentation goes on, after which the inflated mass is again kneaded, when it is ready to be cut into pieces and weighed. These pieces are then shaped into loaves, and set aside for an hour or two, during which time they swell up to nearly double their former size; they are then placed in the oven and baked. During this operation they continue for a time to increase in size, in consequence of the dilation of the pent-up gas by the heat of the oven, until at length the fermentation is checked, and the dough becomes too solid to admit of further alteration.

Remarks. A number of other processes are used by cooks and confectioners to make the different varieties of fancy bread, cakes, puddings, &c., most of which vary according to the peculiar characteristic it is desired to communicate to them. Thus some kinds of cakes and pastes are made to eat "*short*," as it is called, or are rendered less tenacious, and a species of brittleness imparted to them by the addition of starch and sugar. In pastry a similar effect and peculiar lightness is produced by butter or lard, while in some articles, white of egg, gum-water, isinglass, and other adhesive substances are added to produce an exceedingly light and porous mass.

The different varieties of bread made in England vary chiefly in their quality, according to the flour of which they are formed. *The best white bread* is made from the purest wheat flour; *ordinary wheaten bread*, of flour to which a little of the finest bran has been added; *seconds*, from flour containing a still larger portion of bran; and common household bread, from flour produced by grinding the whole substance of the grain without any separation of the bran. Symnel bread, manchet or roll bread, and French bread are varieties made of the purest flour, from the finest wheat, a little milk being usually added for rolls, and butter and eggs for choicer purposes. Several other minor kinds of bread are also made, varied by the addition of sundry trifles, as sugar, currants, and other palatable ingredients. The Scotch "short bread" is made from a *very thick dough*, to which butter, sugar, orange-peel, and spices, are added. (See Gingerbread.)

In France a number of different kinds of bread are made. The "*pain bis*" is the coarsest sort, and is made of a mixture of groats and wheat flour; the "*pain bis blanc*" is made of a mixture of oatmeal and wheat flour; the "*pain blanc*" of flour from which the finest portion has been sifted; the "*pain mollet*," or soft bread, is made of the purest wheat flour, from the finest grain; the "*pain chaland*," made from the same materials as the last, but the paste is pounded; the "*pain chapalé*" is a small variety of bread, similar to the French or roll bread of England; the "*pain cornu*" is a kind of small bread, named from being done up into four-cornered pieces; the "*pain de la reine*" is another variety of small bread, and the "*pain gruau*" is a bread which has been made of late years in Paris, prepared from the small granular particles separated from the best wheat after a slight grinding. The French have also their soup bread and their country white bread, besides several other varieties, not mentioned in the above list.

In the manufacture of white bread from damaged or inferior flour, a large quantity of alum is employed by the bakers, but with the best flour no alum is required. The utmost beauty, sponginess, and sweetness, may be given to bread without the addition of one particle of alum, provided the best materials are employed. As such is not, however, generally the case, it is a common practice with the bakers to introduce 4 or 5 oz. of alum to every sack of flour, or about 1 oz. to each bushel. The method of detecting this adulteration will be presently explained. The proper quantity of salt to be used is 6 or 7 lbs. to the sack, or 1¼ lbs. to the bushel. 1 sack of the best flour, and 6 lbs. of salt, ought to yield about 360 lbs. of *good bread*, and a sack of seconds 345 to 350 lbs. of bread.

Wheaten bread, made of pure materials, is one of the most wholesome articles of food, and has been justly termed the staff of life. When well fermented and baked, it is very easy of digestion. It should never be eaten till it has stood 24 hours after being taken out of the oven, as newer bread is apt to disagree with the stomach, frequently producing flatulence, heartburn, and indigestion.

Adult. This is often carried to a fearful extent: Mr. Accum says, "The bakers' flour is very often made of the worst kinds of damaged foreign wheat, and other cereal grains mixed with them in grinding the wheat into flour. In this capital, no fewer than six distinct kinds of wheaten flour are brought into the market. They are called fine flour, seconds, middlings, fine middlings, coarse middlings, and twenty-penny flour. Common garden beans and peas are also frequently ground up among the London bread flour.

"The smallest quantity of alum that can be employed with effect to produce a white, light, and porous bread, from an inferior kind of flour, I have my own baker's authority to state, is from 3 to 4 oz. to a sack of flour weighing 240 lbs."

"The following account of making a sack of five bushels of flour into bread, is taken from Dr. P. Markham's 'Considerations on the Ingredients used in the Adulteration of Flour and Bread,' (p. 21:) 5 bushels of flour; 8 oz. of alum; 4 lbs. of salt; ½ gallon of yeast, mixed with about 3 gallons of water.

"Another substance employed by fraudulent

It is, perhaps, more *frequently* used, and in a *greater variety* of complaints, than any other medicine.

CALUMBINE. *Syn.* CALOMBINE. The bitter principle of calumba root. It is extracted by alcohol or ether from the root, reduced to a coarse powder, and is purified by repeated resolutions and evaporations. When pure, it forms prismatic crystals, or delicate white needles; it readily combines with acetic acid, and the compound is intensely bitter; hence vinegar, or sour wine, would be the best menstruum to make infusion of calumba with. The properties of calumbine are similar to those of calumba root.

CALVES' FEET JELLY. *Prep.* For each foot take 3 pints of water, and boil it to one-half; then let it cool, and skim off the fat. It must now be boiled for 2 or 3 minutes, with the peel of a lemon, and a little spice, when it should be removed from the fire, strained through a flannel bag, and the juice of a lemon and a glass of wine added; when cooled a little, it may be put into glasses or forms.

Remarks. If wanted very transparent, the jelly, after the fat is removed, should be gently warmed, just enough to melt it, and then well beaten with the white of an egg and the seasoning, after which it must be brought to a boil for a minute or two, when it will be ready for straining, and being mixed with the wine. The addition of a little beet-root juice will give it a beautiful color. The calf's feet should not be bought ready boiled, but only scalded. Cows' feet or heels make as good jelly as that from calves' feet, and are much more economical.

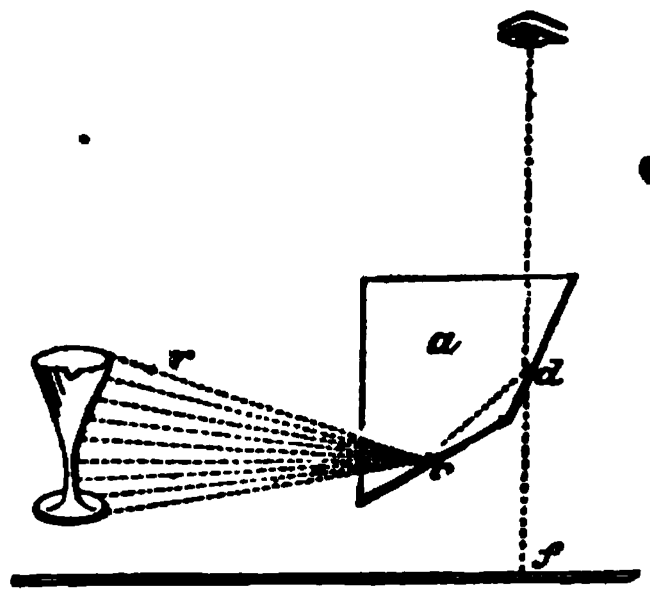
CALX OF ANTIMONY. *Syn.* DIAPHORETIC ANTIMONY. Impure antimonious acid, prepared by deflagrating crude antimony with 3 times its weight of saltpetre.

CAMELEON, MINERAL. *Prep.* Heat to redness a mixture of equal parts of black oxide of manganese, and nitre or potassa.

Prop., &c. When dissolved in water, its solution, at first green, passes spontaneously through all the colored rays to the red, when, if potassa be added, the color retrogrades until it reaches the original green. The addition of oil of vitriol, or chlorine, renders the solution colorless. The addition of a weak acid, or even boiling or agitating the liquid, will turn it from green to red.

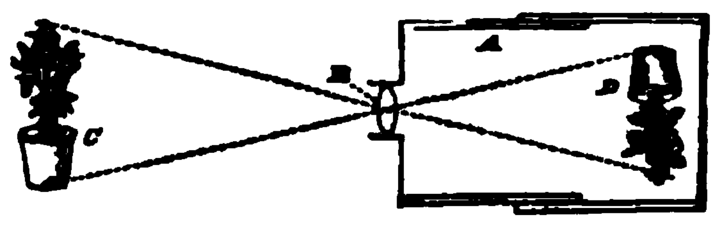
CAMERA LUCIDA. An instrument invented by Dr. Wollaston, for the purpose of enabling persons ignorant of drawing or perspective, to trace the outlines of distant objects or landscapes with accuracy.

Prin. and Cons. When a ray of light (*r*) falls upon a quadrangular glass prism, (*a*,) it is bent by two reflections, (at *c* and *d*,) and thrown upwards where it may be received by the eye, to which it will appear described on the table or sheet of paper, (*f*,) placed to receive it. The point of a pencil used to trace any object on the paper, can also be seen, and by its means the picture may therefore be easily copied. Various modifications of this instrument exist. When the prism is mounted on a stand, and a thin brass plate, with a small hole through it for the eyepiece, adjusted thereto, it forms the instrument sold by the opticians. The image may be magnified or lessened by placing a lens, so as either to intercept the rays before they strike the prism, or before they reach the eye. An ingenious person will readily be able to set up the instrument.



CAMERA OBSCURA Literally, a dark chamber. An optical apparatus, by which the images of external objects are thrown upon any white surface, placed in an obscure situation to receive them, whereby they are represented in their natural forms and colors.

Prin. and Cons. A convex lens (*B*) is placed in a hole admitting the light into a darkened box or chamber, (*A*,) which, falling on a white ground (*D*) within the room, produces an inverted picture of every object within its range. The image thus formed may be restored to its natural position, by allowing the rays of light to pass through two lenses instead of one, or by receiving the rays on a mirror placed at an angle of 45°, when the image will be thrown on the floor in its original position. The picture may be viewed through an oblong aperture cut in the box, or the experiment may be performed in a darkened room, by placing the lens in a hole in the shutter, allowing the image to fall on the wall, (white,) or a sheet of paper stretched to receive it. The following engraving will explain the construction of this instrument.



A, A box formed of two parts, to slide one within the other, to adjust the screen or hind wall to receive the image.
B, Convex lens.
C, External object.
D, Ditto painted in a reversed position on a screen or wall.

When intended as an instrument for taking views or portraits, the image is thrown upon a mirror placed at an angle of 45°, and resting on the bottom of the box, by which means it is thrown upwards against a plate of glass, also placed at a similar angle. On this is laid a piece of semi-transparent paper, when the object is seen painted on it, and may be traced out with a pencil.

CAMPHOR. *Syn.* CAMPHIRE. KAMPHUR. CAMPHORA, (*Lat.*) *Hist. and Source.* The camphor of commerce is a natural production. It is principally extracted from the laurus camphora, or laurel camphor tree, but it is also found in several other members of the vegetable kingdom

It is occasionally found in small masses, between the bark and the wood, in a perfectly pure state. The Chinese and Japanese extract the camphor by cutting the wood into small pieces, and boiling it with water in iron vessels,—which are covered with large earthen capitals or domes,—lined with rice straw. As the water boils, the camphor is volatilized along with the steam, and condenses on the [illegible]w, under the form of grayish granulations. In this state it is collected and transported to Europe, when it undergoes the process of refining into white camphor.

Proc. of Refining. 100 parts of crude camphor are mixed with 2 parts each of quicklime and animal charcoal, and placed in a thin globular glass vessel, sunk in a sand-bath. The heat is then cautiously applied, and the vessel gradually and carefully raised out of the sand as the sublimation goes on. When this is completed, the whole is allowed to cool.

Remarks. If the process be conducted too slowly, or at a heat under 375° Fahr., the product will be flaky, and consequently unsaleable, without remelting or subliming. An improvement on this process would be, simply to sublime the above mixture in any convenient vessel, furnished with a large and well-cooled receiver, and to remelt the product in close vessels under pressure, when it hould be cooled as rapidly as possible.

Prop., Uses, &c. A white semi-crystalline solid, very volatile at common temperatures. Soluble in alcohol, ether, oils, and acetic acid, and sufficiently so in water (about 1¼ grs. to 1 oz.) to impart its characteristic smell and taste. It is stimulant, narcotic, anodyne, and diaphoretic, and is given in doses of 2 to 20 grs., in the form of pills or bolus, or made into an emulsion with yelk of egg, mucilage, or almonds. An overdose of camphor is accompanied with symptoms of poisoning. The best antidote is opium. Camphor is frequently put into wardrobes and clothes-trunks, to keep away insects, and it is used to make the white stars and fire of the pyrotechnist. Mixed with copal, it renders that gum soluble in some essential oils and alcohol. (See COPAL.) Mixed with six times its weight of clay, and distilled, it undergoes decomposition, and yields a yellow aromatic oil, smelling strongly of thyme and rosemary, which, I am told, is much used to adulterate some of the more costly essential oils.

CAMPHOR, ARTIFICIAL. Kind first discovered, and Trommsdorff and Boullay confirmed the fact, that rectified oil of turpentine, exposed to the action of muriatic acid, absorbs that gas with the production of a white crystalline mass resembling camphor.

CAMPHOR FROM ESSENTIAL OILS. *Prep. &c.* By careful distillation of ½ of the oil, the remaining portion, on being cooled, will be found to contain a species of camphor, on separating which, and redistilling the remainder of the oil, 2 or 3 times, the whole of the camphor may be obtained. *Oil of rosemary*, treated in this way, yields about 10% of camphor; *oil of sweet marjoram* the same; *oil of sage* yields 13%; *oil of lavender* 25%. That from sage oil forms cubical crystals, insoluble in nitric acid; that from marjoram oil is scarcely volatile or inflammable. By keeping the oils loosely corked, and in a cool place, they produce a larger portion of this pseudo-camphor. The substance called *aniseed camphor* is procured by pouring off the liquid portion of the oil, after it has been partially frozen by exposure to a cool atmosphere.

CAMPHOR CAKE. *Prep.* I. Camphor liniment, (P. L.,) 1 oz.; melted spermaceti 1 drachm; mix.

II. White almond oil 4 oz; spermaceti ¾ oz.; melt, add camphor, (cut small,) 1 oz.; stir until melted, then pour it into shapes and allow it to crystallize.

CAMPHOR JULEP, CONCENTRATED *Syn.* ESSENCE OF CAMPHOR. *Prep.* Camphor 1 oz.; rectified spirit 10 oz. by weight; dissolve. *Use.* 20 drops, added to 1 fluid oz. of pure cold water, makes transparent camphor julep.

CAMPHOR, TO POWDER. Camphor may be beaten in a mortar for some time, without being reduced to powder, but if it be first broken with the pestle, and then sprinkled with a few drops of spirit of wine, it may be readily pulverized. Powdered camphor is much used in tooth powders, fireworks, &c.

CAMPHORATED ACETIC ACID. *Prep.* Dissolve ℥ss of camphor, in ℥viss of acetic acid, (P. E.) *Use.* Similar to aromatic vinegar.

CAMPHORATED CHALK. *Syn.* CRETACEOUS TOOTH POWDER. *Prep.* I. Precipitated chalk 3 oz.; camphor 1 oz. *Proc.* Add a few drops of spirit of wine to the camphor, then reduce it to a fine powder, and mix it (perfectly) with the chalk; lastly, pass it through a clean sieve of sufficient fineness.

II. Prepared chalk (not precipitated) 7 oz.; camphor 1 oz.; as last.

Use. Extensively employed as a dentifrice. It should be kept in corked bottles, to prevent the camphor flying off.

CAMPHORIC ACID. *Prep.* Put 1 part of camphor and 4 parts of nitric acid, sp. gr. 1·33, into a glass retort, connected with a receiver, and apply a gradually increasing heat, until vapors cease to be extricated; then add the camphor that has been volatilized to the acid in the retort, along with 4 or 5 parts more of nitric acid. Repeat the process again and again, until 20 parts of nitric acid have been consumed. When the whole of the camphor is acidified, it will crystallize in the remaining liquor. When the whole is perfectly cold, it must be thrown upon a filter and well washed with distilled water, after which it must be dissolved in boiling water, evaporated to a pellicle, and set aside to crystallize.

Prop. The crystals somewhat resemble those of muriate of ammonia. They are soluble in alcohol, and are not precipitated from it by water, by which camphoric acid may be distinguished from benzoic acid. With the bases it forms salts called camphorates. The soluble camphorates may be made by digesting the carbonate or hydrate of the base in a hot solution of the acid, and the insoluble ones, by double decomposition.

CAMPHORIC ETHER. *Syn.* CAMPHORATE OF OXIDE OF ETHULE. *Prep.* By heating camphoric acid, sulphuric acid, and alcohol together, a colorless, sirupy liquid is formed, which must be submitted to distillation, and the product dissolved in alcohol. When the liquid ceases to deposite crystals of camphoric acid, water must be added, when

the attention of organic chemists, from being a modification of the principle called proteine by Mulder. When caseine is thrown down from milk by adding an acid, it combines with a little of it, forming a kind of salt. With sulphuric acid a sulphate of caseine is formed. The acid may be removed by means of carbonate of lead, when pure caseine is left behind. LEGUMINE is vegetable caseine. By first adding a little caustic potassa to albumen, and then some alcohol, a precipitate is formed, having all the properties of caseine. (Liebig.)

CASKS, PRESERVATION OF. Casks last longest when kept either in a dry situation, or one uniformly very moist. The continual variation from the one to the other speedily rots them. As soon as casks are emptied they should be bunged down quite air-tight, with as much care as if they were full, by which means they will be preserved sweet. Should any of the hoops become loose, they should be immediately driven up tight, which will at once prevent the liability of their being lost or misplaced, as well as the casks fouling or becoming musty from the admission of air. Good casks are very expensive articles. The casks and vats belonging to the great brewery of Barclay & Co., of London, are said to be worth several score thousand pounds.

CASKS, SWEETENING MATCH FOR. *Prep.* Dip a strip of coarse linen cloth into melted brimstone. *Use.* Set fire to the brimstone match formed as above, put it into the cask, and keep it suspended by fastening one end under the bung, which should be driven in tight. After the lapse of 1 or 2 hours, the match may be removed.

CASKS, STINKING OR MUSTY, (TO (SWEETEN.) For this purpose numerous plans are followed, among which the following may be mentioned. In every case great care should be taken to scald or well wash the casks out before filling them with liquor.

I. Wash them well out with oil of vitriol, diluted with an equal weight of water; afterwards soak them in clean water and rinse them well.

II. Wash them first with a little chloride of lime and hot water, then with water soured with oil of vitriol, and lastly, with pure water, until all the fumes and smell are removed.

III. Match them with sulphu or with sulphur mixed with a very little saltpetre

IV. Unhead them and whitewash them with milk of lime, made pretty strong. This plan is commonly followed for brewer's vats.

V. Remove the heads and char the insides of the staves, by the aid of a fire of shavings, kindled within them. A safer and more effectual method is to wash the *dry* casks out with the most concentrated oil of vitriol. This will char not only the surface of the staves, but penetrate into *all* the cracks, which the fire cannot reach. The expense is trifling. The strongest oil of vitriol, sp. gr. 1·845, may be bought in quantity at 1½*d.* per lb., and 1 gallon, worth about 2*s.*, will wash out upwards of 50 hogsheads, if common care be taken not to waste it. *Caution.* As oil of vitriol is powerfully caustic and corrosive, great care should be taken to avoid splashing it over the skin or clothes, as it will rapidly burn them.

VI. Steam has lately been applied to the insides of casks, with great advantage. High-pressure steam is driven in at the bung-hole, at the same time that the cask is violently agitated, (a heavy chain having been previously put into it,) until all the dirt and bad smell is removed. This plan has been lately patented.

VII. Washing the casks out with a lye of pearl-ash, or soda, with milk of lime, strong hot brine, cow-dung, salt and water, and other similar liquors has been adopted, by some persons. The coopers boil the staves for gin casks in a strong lye of alum before placing them together, to prevent their coloring the spirit, but washing with oil of vitriol is a better plan. Some persons fill musty casks with water, and add 3 or 4 lbs. of coarsely-powdered charcoal, and agitate well for a few days.

CAST ENGRAVINGS. These are made by taking a mould from any kind of engraving, and in pouring on this mould an alloy, in a melted state, capable of taking the finest impression. Bronze, type metal, zinc, &c., have been used for this purpose.

This plan is particularly applicable to engravings which meet with a ready sale, and of which a large number is required. As soon as one cast is worn out, another may be taken from the original plate, so that not only will every impression be a proof, but the whole expense of retouching will be avoided. For another method of multiplying engravings, see ELECTROTYPE.

CASTS, (IN FUSIBLE METAL.) A combination of 3 parts of lead, with 2 of tin, and 5 of bismuth, forms an alloy which melts at the temperature of 197° Fahr.

In taking casts with this and similar alloys, it is important to use the metal at a temperature as low as possible; as, if but a few degrees elevated, the water which adheres to the things from which casts are to be taken is converted into vapor, and produces bubbles. The fused metal must be allowed to cool in a teacup until just ready to set at the edges, and then poured into the moulds. In this way beautiful casts from moulds of wood, or of other similar substances, may be procured. When taking impressions from gems, seals, &c., the fused alloy should be placed on paper or pasteboard, and stirred about till it becomes pasty, from cooling, at which moment the gem, die, or seal, should be suddenly stamped on it, and a very sharp impression will then be obtained. (Jour. of Science, No. 26.)

CASTORINE. *Syn.* CASTORINA. CASTOREUM CAMPHOR. *Prep.* Cut castor into small pieces and boil it in 6 times its weight of alcohol. On cooling, it will deposite the castorine, which, by re-solution in alcohol, may be obtained under the form of prismatic acicular crystals.

Remarks. Genuine Russian castor must be employed in the above process, as scarcely any castorine can be obtained from the American. Castorine is soluble both in ether and hot alcohol, is inflammable, and by long boiling with nitric acid, becomes converted into castoric acid. This acid is capable of forming salts with the bases.

CATALEPSY. *Syn.* CATALEPSIS. CATALEPSIA. TRANCE. A disease in which the organs of sense and motion cease to exercise their functions, and the heart and lungs feebly perform their offices and in a scarcely perceptible manner. The

paroxysm generally comes on without previous warning, and its duration varies from a few minutes to several days, and if medical reports are to be credited, sometimes for a much longer period. Dr. Cullen affirms that this disease is always counterfeited, but this surely cannot be correct.

Treat. Ammoniacal stimulants applied to the nostrils, and spirituous liquors injected into the stomach, with general friction and free access to pure air, are the best remedies. Electricity and galvanism should also be had recourse to, when the instruments are at hand.

CATARRH. *Syn.* CATARRHUS. In popular language, a cold in the head or chest. Influenza is a severer form of this complaint, and has been called epidemic catarrh.

The common symptoms of catarrh are a copious discharge from the eyes and nose, a hoarseness, and generally a cough, more or less severe. The exciting causes are sudden changes of temperature and exposure to currents of cold air, while the body is heated; hence the frequency of colds in changeable weather.

Treat. A light or spoon diet should be adopted, and animal food and fermented or spirituous liquors should be particularly avoided. The bowels should be opened with some mild aperients, and if the symptoms be severe, or fever or headache be present, small diaphoretic doses of antimonials, accompanied by copious draughts of diluents, as barley-water, weak tea, or gruel, should be taken. Unless in very bad cases, this treatment, with proper care, will generally effect a cure.

CATECHINE. *Syn.* CATECHUIC ACID. RESINOUS TANNIN. *Prep.* Cubical gambir or catechu, powdered and treated with cold water, leaves an insoluble residuum, which, by repeated solutions in alcohol, may be obtained under the form of white silky needles.

Prop. It strikes a green color with the salts of iron, but does not precipitate gelatine. When dissolved in caustic potassa, and the solution exposed to the air, oxygen is absorbed and JAPONIC ACID formed. If, instead of caustic potassa, the carbonate be employed, it is converted into RUBINIC ACID.

CATGUT. *Syn.* CORDE A BOYAU, (*Fr.*) DARMSAITE, (*Ger.*) The prepared and twisted intestines of animals. *Prep.* The guts, taken while warm from the animal, are thoroughly cleaned, freed from adherent fat, and well rinsed in pure water. They are next soaked for about 2 days in water, after which they are laid on a table and scraped with a copper-plate, having a semi-circular notch, beginning the operation at the smaller end. The guts are then put into fresh water, and soaked until the next day, when they are again scraped, the larger ends cut off, and after well washing, again steeped for a night in fresh water, and then for 2 or 3 hours in lye water, each gallon of which contains 1 oz. each of pearlash and potash. They are lastly washed in clean water, and passed through a polished hole in a piece of brass to smooth and equalize their surface, and then twisted and sorted according to the purposes for which they are intended.

Remarks. Catgut is employed in several of the arts. The strings of harps, and all the instruments of the violin class, are formed of this material. For this purpose the mucous and peritoneal membranes are removed with great care, they are then soaked for a day or two in water, to which potash is added, then removed to water impregnated with burnt lees of wine, which is made stronger by degrees, scraping them carefully to separate the fat. As soon as the intestines begin to float, they are immediately taken out, twisted, brimstoned, again twisted, and dried; when sufficiently dry, the catgut is rubbed over with olive oil, and kept as long as convenient before use, as it improves by age. *Whipcord* is made from catgut, which is sewed together while soft with the *filandre* or scrapings, after which it is put into a frame and twisted. It next receives 1 or 2 sulphurings, and is then dyed and coiled up for sale. Red and black ink, infusion of logwood, to which a little alum or blue vitriol has been added, (blue and purple,) distilled verdigris or sap green, are the dyes commonly employed. *Bowstrings* for hatmakers are made out of the largest intestines, 4 to 12 of which are twisted together, until the cord is extended to 15 to 25 feet in length. It is then rubbed perfectly smooth and free from knots, half dried, sulphured twice, again stretched and sulphured, and lastly, dried in a state of tension. *Clockmaker's cords* are made of the smallest intestines. When wanted particularly small, they are slit into strings by means of a knife, fitted with a ball to guide it. In this operation the gut is strained over the ball, and an equal portion of the divided gut pulled down by each hand, while the knife remains immoveable. This method is similar in principle to that by which the barrels of straws are divided by the straw-plait makers.

The best *fine* catgut comes from Italy, and is made at Venice or Rome. The superiority arises from its being prepared from the intestines of thin sinewy sheep, while that made in England is formed from the fat sheep killed for the shambles. It has long been known to physiologists, that the membranes of healthy lean animals are much tougher than those of fat ones. This is well exemplified in the human species; few men being at the same time very muscular and corpulent.

A coarse species of catgut, used for turning lathes and similar purposes, is made from the intestines of horses. The guts, previously cleaned, are soaked in water, with a pailful of weak solution of chloride of lime for each 8 or 10 sets; the mucous membrane is then separated, the intestine cut into 4 strips by forcing a ball with 4 knives placed crosswise along them; these strips are next twisted, and when dry, any slight inequalities removed by fish skin.

CATHARTICS. *Syn.* PURGATIVES. These have been divided into 5 orders or classes, according to their particular actions. The following are the principal of each class.

1. (*Laxatives, lenitives, or mild cathartics.*) Manna, cassia pulp, tamarinds, prunes, honey, and phosphate of soda; castor, almond, and olive oils; ripe fruit.

2. (*Saline, or cooling laxatives.*) Epsom salts, glauber salts, phosphate of soda, (tasteless salts,) seidlitz powders, &c.

3. (*Active cathartics, occasionally acrid, frequently tonic and stomachic.*) Rhubarb, senna, aloes, &c.

4. (*Drastic or violent purgatives.*) Jalap,

scammony, gamboge, croton oil, colocynth, elaterium, &c.

5. (*Mercurial purgatives.*) Calomel, blue-pill, quicksilver with chalk, &c.

The doses of all the above will be found in the table of the doses of medicines, as well as at the end of the notices of most of them, in their alphabetical order.

CATHARTINE. The purgative principle of senna, obtained by Lassaigne and Fenuelle from a strong aqueous infusion of the leaves. *Prep.* Evaporate to the consistence of a sirup, out of contact with the air, then digest in alcohol, filter, and evaporate. *Prop.* Color, reddish; taste and smell, nauseous; it is soluble in water and alcohol, and strongly cathartic.

CATHETER. A long hollow tube introduced into the bladder, for the purpose of drawing off its contents. Catheters are either made of metal or elastic gum; and if of the former material, a suitable shape is given to them, for the purpose of accommodating them to the flexure of the urethra.

Prep. I. Coat a piece of smooth catgut with melted wax, and while still warm, bend it to a proper shape. When cold, dip it repeatedly into an ethereal solution of Indian rubber, until a sufficient thickness is obtained, dry by a gentle heat, and then boil it in water to melt out the wax, and to allow the catgut to be withdrawn. A piece of polished steel wire may be used instead of catgut.

II. Instead of applying the caoutchouc in solution, wind ribands of it round the wire, having previously softened their edges with ether, or by boiling in water. Over this wind, as tightly as possible, a strong silk riband, and over all some fine packthread. The next day boil the whole in water for half an hour, and withdraw the wire; lastly, polish off the outside as smoothly as possible. (See CAOUTCHOUC.)

III. Weave a smooth tissue of silk over the bent wire, and then coat it with a surface of Indian rubber, or elastic varnish. Finish it off as before.

CAUDLE, (IN COOKERY.) A species of gruel. Made with oatmeal, groats, rice, or wheat flour, and mixed with half its weight of good ale, and as much mace, nutmeg, sugar, &c., as will make it agreeable. White wine, the juice of a lemon, a little of the peel grated, with 1 or more eggs, are frequently added. It is an excellent domestic remedy for colds, &c., unaccompanied with fever, for which purpose it should be taken on going to rest.

CAUSTICS. Substances that corrode or destroy the texture of the skin and organized bodies. Their action is commonly called "burning."

The principal caustics employed by surgeons are, *nitrate of silver*, *caustic potassa*, *sulphate of copper*, *red oxide of mercury*, and the *nitric* and *acetic acids*.

Use. Caustics are employed to remove excrescences, morbid growths, granulations, &c., as corns, warts, and proudflesh, and to open issues, abscesses, &c.

CAUSTIC, COMMON. *Syn.* POTASH WITH LIME. POTENTIAL CAUTERY. POTASSA CUM CALCE. *Prep.* Hydrate of potassa and quicklime, equal parts; rub them together in a mortar, and keep them in a well-corked bottle. (P. L.) *Use.* When placed on the skin, it rapidly decomposes it, leaving a soft eschar, which is slowly detached. It is employed to open issues, abscesses, &c.

CAUSTIC, COMMON. *Syn.* CAUSTICUM COMMUNE MITIUS. (P. L. 1745.) *Prep.* Soft soap and quicklime, equal parts. Mix them at the time of use.

Remarks. Both the above are less liable to spread than pure potassa, but are considerably weaker.

CAUSTIC, (FOR CANKER IN HORSES.) *Prep.* Dissolve corrosive sublimate ½ oz. in muriatic acid 1 oz., then add rectified spirit and water, of each 4 oz.

CAUSTIC, OPIATE. *Syn.* COMMON CAUSTIC WITH OPIUM. Common caustic 4 dr.; powdered opium 1 dr.; soft soap enough to mix. *Use.* Applied to fungous ulcers.

CEMENT. Any substance which, on being placed between two surfaces, makes them adhere together. This name is also applied (in architecture) to some species of mortars, employed either to unite stones or bricks into masses, or as a protective covering against the weather or water.

CEMENT, ALABASTER. *Prep.* I. Finely-powdered plaster of Paris, made into a cream with water.

II. Melt yellow resin, or equal parts of yellow resin and beeswax, then stir in half as much finely-powdered plaster of Paris.

Use. The first is used to join and fit together pieces of alabaster or marble, or to mend broken plaster figures. The second is used to join alabaster, marble, porphyry, Derbyshire spar, and any similar substances, that will bear being heated. It must be applied hot, and the stone must be made warm. Derbyshire, and some other stones, may also be joined by heating them sufficiently to melt a lump of sulphur, with which their edges must be then smeared, after which they must be placed together, and held so until cold. Little deficiencies, as chips out of the corners, &c., may be filled up with melted sulphur or bleached shellac, colored to any shade, as required.

CEMENT, ARCHITECTURAL. *Prep.* I. Reduce paper to a smooth paste by boiling it in water; then add an equal weight each of sifted whiting and good size; boil to a proper consistence.

II. Paper, paste, and size, equal parts; finely-powdered plaster of Paris, to make it of a proper consistence. Use it as soon as mixed.

Use. To make architectural ornaments, busts, statues, columns, &c. It is very light, and receives a good polish, but will not stand the weather.

CEMENT, ARMENIAN. *Syn.* DIAMOND CEMENT. PERSIAN DITTO, TURKISH DITTO. This article, so much esteemed for uniting pieces of broken glass, for repairing precious stones, and for cementing them to watch cases and other ornaments, is made by soaking isinglass in water until it becomes quite soft, and then mixing it with spirit in which a little gum mastic and ammoniacum have been dissolved.

The jewellers of Turkey, who are mostly Armenians, have a singular method of ornamenting watch-cases, &c., with diamonds and other precious stones, by simply glueing or cementing them on. The stone is set in silver or gold, and the lower part of the metal made flat, or to correspond with the part to which it is to be fixed; it is then warmed gently, and has the glue applied, which

is so very strong that the parts thus cemented never separate; this glue, which will strongly unite bits of glass, and even polished steel, and may be applied to a variety of useful purposes, is thus made in Turkey:—Dissolve five or six bits of gum mastich, each the size of a large pea, in as much spirits of wine as will suffice to render it liquid; and in another vessel, dissolve as much isinglass, previously a little softened in water, (though none of the water must be used,) in French brandy or good rum, as will make a two-ounce vial of very strong glue, adding two small bits of gum galbanum, or ammoniacum, which must be rubbed or ground till they are dissolved. Then mix the whole with a sufficient heat. Keep the glue in a vial closely stopped, and when it is to be used, set the vial in boiling water. Some persons have sold a composition under the name of Armenian cement, in England; but this composition is badly made; it is much too thin, and the quantity of mastich is much too small. (Eton.)

II. The following are good proportions: isinglass, soaked in water and dissolved in spirit, 2 oz., (thick;) dissolve in this 10 grains of very pale gum ammoniac, (in tears,) by rubbing them together; then add 6 large tears of gum mastich, dissolved in the least possible quantity of rectified spirit.

III. Isinglass, dissolved in proof spirit, as above, 3 oz.; bottoms of mastich varnish (thick but clear) 1½ oz.; mix well.

Remarks. When carefully made, this cement resists moisture, and dries colorless. As usually met with, it is not only of very bad quality, but sold at exorbitant prices.

CEMENT, BRUYERE'S WATER. *Prep.* Mix 3 gallons of clay with 1 gallon of slaked lime, and expose them to a full red heat for 3 hours.

CEMENT, BUILDING. *Syn.* ARTIFICIAL PUZZOLENE. *Prep.* This is made by exposing a mixture of clay or loam, broken pottery, flints, or silicious sand, or broken bottle-glass, with wood ashes, to a considerable heat in a furnace, until it becomes partially vitrified. It must then be ground to a fine powder, sifted, and mixed with one-third its weight of quicklime, also in fine powder, after which it must be packed (tight) in casks to preserve it from the air and moisture. For use, it is mixed up with water, and applied like Roman cement.

CEMENT, BOTANY BAY. Yellow gum and brickdust equal parts, melted together. Used to cement coarse earthenware, &c.

CEMENT, CHINESE. *Prep.* Dissolve shellac in enough rectified spirit to make a liquid of the consistence of treacle.

II. Instead of spirit, use wood naphtha, (pyroxilic spirit.)

III. Boil borax 1 oz. and shellac 4 oz in water until dissolved.

Use. To mend glass, china, fancy ornaments, &c. The first form produces a cement so strong that pieces of wood may be joined together, cut slopingly across the grain, and will afterwards resist every attempt to break them at the same place. In many of the islands of the Indian Ocean, in Japan, China, and the East Indies, a similar cement is used to join pieces of wood for bows, lances, &c. The fluid is thinly smeared over each face of the joint, a piece of very thin gauze interposed, and the whole pressed tightly together and maintained so until the next day Joints so made will even bear the continual flexure of a bow without separating.

CEMENT, COPPERSMITHS'. Bullock's blood thickened with finely powdered quicklime. *Use.* To secure the edges and rivets of copper boilers, to mend leaks from joints, &c. It must be used as soon as mixed, as it rapidly gets hard. It is extremely cheap and very durable, and is suited for many purposes where a strong cement is required. It is frequently called *blood cement.*

CEMENT, CUTLERS'. *Prep.* I. Black rosin 4 lbs.; beeswax 1 lb.; melt, then add 1 lb. of finely-powdered and well-dried brickdust.

II. Equal weights of rosin and brickdust melted together.

Use. To fix knives and forks in their handles.

CEMENT, EGG. White of egg thickened with finely-powdered quicklime. *Use.* To mend earthenware, glass, china, marble, alabaster, spar ornaments, &c. It does not resist moisture.

CEMENT, ELECTRICAL AND CHEMICAL, (SINGER'S.) I. Rosin 5 lbs.; wax and dry red ochre, in fine powder, of each, 1 lb.; plaster of Paris 4 oz.; melt the first two, then add the ochre, and, lastly, the plaster. Mix well together.

II. Black rosin 7 lbs.; well-dried red ochre and plaster of Paris, of each, 1 lb.; as above.

Use. To cement the plates in voltaic troughs, join chemical vessels, &c.

CEMENT, ENGINEERS'. I. Mix ground white-lead with as much powdered red-lead as will make it of the consistence of putty.

II. Mix equal weights of red and white lead with boiled linseed oil to a proper consistence.

Use. Employed by engineers and others to make metallic joints. A washer of hemp, yarn, or canvass smeared with the cement is placed in the joint, which is then "brought home," or screwed up tight. It dries as hard as stone.

This cement answers well for joining broken stones, however large. Cisterns built of square stones, put together, while dry, with this cement, will never leak or come to repair. It is only necessary to use it for an inch or two next the water; the rest of the joint may be filled with good mortar. It is better, however, to use it for the whole joint.

CEMENT, EXTEMPORANEOUS. Shellac melted and run into small sticks the size of a quill. *Use.* To join glass, earthenware, &c. The edges must be heated sufficiently hot to melt the cement, which must be then thinly smeared over them, and the joint made while they are still hot. This is the cement so commonly vended in the streets of London.

CEMENT, FRENCH. *Prep.* Make a thick mucilage with gum arabic and water, then add starch in fine powder to thicken it. *Use.* Employed by naturalists and French artificial-flower makers. A little lemon juice is sometimes added.

CEMENT FOR IRON BOILERS, &c. *Prep.* Dried clay in powder 6 lbs.; iron filings 1 lb.; make a paste with boiled linseed oil Used to stop the cracks and leaks in iron boilers, stoves, &c.

CEMENT FOR BROKEN GLASS, CHINA, &c Various preparations and methods are adopted for mending broken china, earthenware, and glass, among which are the following: the white of an egg beaten with quicklime, in impalpable powder, into a paste; to which is sometimes added a little whey, made by mixing vinegar and milk. A little isinglass, dissolved in mastich varnish, is another cement. Nature supplies some cements ready to our hands, as the juice of garlic and the white slime of large snails; and it has been stated in a respectable scientific journal that a broken flint has been joined so effectually with this snail cement, that when dashed upon a stone pavement the flint broke elsewhere than at the cemented part. In their anxiety to unite broken articles, persons generally defeat themselves by spreading the cement too thickly upon the edges of the article, whereas the least possible quantity should be used, so as to bring the edges almost close together; and this may be aided by heating the fragments to be joined. (Chambers's Information for the People.)

(See also ARMENIAN, EXTEMPORANEOUS, CHINESE CEMENTS, &c. &c.)

CEMENT, GAD'S HYDRAULIC. *Prep.* Mix 3 lbs. of well-dried and powdered clay with 1 lb. of oxide of iron; then add as much boiled oil as will reduce them to a stiff paste.

Use. For work required to harden under water.

CEMENT, GLASS GRINDERS'. I. Melt pitch and add thereto one fourth of its weight each of finely-powdered wood-ashes and hard tallow. For coarse work.

II. Melt 4 lbs. of black rosin, then add 1 lb. each of beeswax and whiting previously heated red hot and still warm.

III. Shellac melted, and applied to the pieces previously warmed.

Use. To fix the articles while grinding.

CEMENT, GLUE. *Prep.* I. Melt 1 lb. of glue without water, then add 1 lb. of black rosin and 4 oz. of red ochre.

II. Melt glue without water, then stir in ¼ of its weight each of boiled oil and red ochre.

Use. For various common purposes, especially to fix stones in their frames.

CEMENT, HAMELIN'S, (OR MASTICH.) To any given weight of the earth or earths, commonly called pit-sand, river-sand, rock-sand, or any other sand of the same or the like nature, or pulverized earthenware or porcelain, add two thirds of such given weight of the earth or earths, commonly called Portland stone, Bath stone, or any other stone of the same or like nature, pulverized. To every 560 lbs. of these earths, so prepared, add 40 lbs. of litharge, and with the last-mentioned given weights combine 2 lbs. of pulverized glass or flint stone. Then join to this mixture 1 lb. of minium and 2 lbs. of gray oxide of lead.

When this composition is intended to be made into cement, to every 605 lbs. of the composition are added 5 gallons of vegetable oil, as linseed oil, walnut oil, or pink oil. The composition is then mixed in a similar way to mortar.

When this cement is applied to the purpose of covering buildings intended to resemble stone, the surface of the building is washed with oil.

CEMENT, IRON. This is formed of the borings or turnings of cast-iron, which should be clean and free from rust, mixed with a small quantity of sal ammoniac and flowers of sulphur. When wanted for use, it is mixed up with just enough water to thoroughly moisten it, and it is rammed or calked into the joints with a blunt calking chisel and hammer, after which the joint is screwed up by its bolts as tightly as possible. If the turnings or borings be very coarse, they are broken by pounding in an iron mortar, and the dust sifted off before use. The following are good proportions.

I. Sal ammoniac in powder 2 oz.; flowers of sulphur 1 oz.; iron borings 5 lbs.; water to mix.

II. Sal ammoniac 1 oz.; sulphur ½ oz.; iron borings 6 lbs.; water to mix.

III. Sal ammoniac 2 oz.; iron borings 7 or 8 lbs.; water to mix.

IV. Iron borings 4 lbs.; good pipeclay 2 lbs.; powdered potsherds 1 lb.; make them into a paste with salt and water.

Remarks. The first of these forms is that generally employed for common purposes, but formerly much more sulphur and sal ammoniac were used. I am informed by one of the leading engineers of London, that the strongest cement is made without sulphur, and with only 1 or 2 parts of sal ammoniac to 100 of iron borings, (see the third form;) but that when the work is required to dry rapidly, as for steam joints of machinery wanted in haste, the quantity of sal ammoniac is increased a little, and occasionally a very small quantity of sulphur is added. This addition makes it set quicker, but reduces its strength. As the power of the cement depends on the oxidizement and consequent expansion of the mass, it is evident that the less foreign matter introduced the better. No more of this cement should be made at a time than can be used at once, because it soon spoils. I have seen it become quite hot by standing even a few hours, when it contained sulphur; and I have been informed by workmen, that when much sulphur is used, and it has been left together in quantity all night, combustion has taken place.

The last form produces a cement that gets very hard when allowed to dry slowly.

CEMENT, JAPANESE. *Syn.* RICE GLUE. *Prep.* Intimately mix the best powdered rice with a little cold water, then *gradually* add boiling water, until a proper consistence is acquired, being particularly careful to keep it well stirred all the time; lastly, it must be boiled for 1 minute in a clean saucepan or earthen pipkin.

Use. This glue is beautifully white, and almost transparent, for which reason it is well adapted for fancy paper work, which requires a strong and colorless cement.

CEMENT, KEENE'S MARBLE. The following is an abstract of a paper read by Mr. White before the Society of Arts, and will explain the preparation of this beautiful and useful cement: "Keene's Marble Cement is described as a combination of sulphate of lime and alum.* The gypsum undergoes the same preparation as for plaster of Paris, being deprived of its water of crys-

* A pleasing tint is given to this cement by adding a little solution of green copperas to the alum liquor.

tallization by baking. It is then steeped in a saturated solution of alum; and this compound, when recalcined and reduced to a powder, is in a fit state for use. This cement has been most extensively applied as a stucco; but the finer qualities, (when colored by the simple process of infusing mineral colors in the water with which the cement powder is finally mixed for working,) being susceptible of a high degree of polish, produce beautiful imitations of mosaic, and other inlaid marbles, scagliola, &c. The cement is not adapted to hydraulic purposes, or for exposure to the weather, but has been used as a stucco in the internal decorations of Windsor and Buckingham palaces. From its extreme hardness, it has been found serviceable when used for imbedding and setting the tiles of tesselated pavements, &c.; and has been adopted for this purpose at the French Protestant church, the new fire-proof chambers in Shorter's Court, and the Reform Club-House."

In the course of the discussion which followed, Mr. C. H. Smith and Mr. Lee adverted to the extreme hardness of the cement as its principal recommendation, when applied as stucco and for mouldings.

CEMENT, MAHOGANY. *Prep.* I. Melt beeswax 4 oz.; then add Indian red 1 oz., and enough yellow ochre to produce the required tint.

II. Shellac, melted and colored as above. Very hard.

Use. To fill up holes and cracks in mahogany.

CEMENT, OPTICIAN'S. *Prep.* I. Shellac, softened with rectified spirit or wood naphtha. For fine work.

II. Melt wax 1 oz., and resin 15 oz.; then add whiting 4 oz.; previously made red hot, and still warm.

III. Resin 1 lb.; melt, then add plaster of Paris (dry) 4 oz.

Use. To fix glasses, stones, &c., while polishing and cutting. The last is a very strong cement for rough purposes.

CEMENT, PARABOLIC. *Syn.* Universal Cement. *Prep.* Curdle skim-milk, press out the whey, and dry the curd by a *gentle heat*, but as quickly as possible. When it has become quite dry, grind it to powder in a coffee or pepper mill, and mix it with $\frac{1}{10}$ of its weight of finely-powdered quicklime, and a piece of camphor the size of a pea, also reduced to powder, to every ounce of the mixture. Keep it in wide-mouth 1 oz. vials, well corked. *For use*, make it into a paste with a little water, and apply it immediately.

CEMENT, PARKER'S. This valuable cement is made of the nodules of indurated and slightly ferruginous marl, called by mineralogists septaria, and also of some other species of argillaceous limestone. These are burned in conical kilns, with pit coal, in a similar way to other limestone, care being taken to avoid the use of too much heat, as if the pieces undergo the slightest degree of fusion, even on the surface, they will be unfit to form the cement. After being properly roasted, the calx is reduced to a very fine powder by grinding, and immediately packed in barrels, to keep it from the air and moisture.

Use. It is tempered with water to a proper consistence, and applied at once, as it soon hardens, and will not bear being again softened down with water. For foundations and cornices exposed to the weather, it is usually mixed with an equal quantity of clean angular sand; for use as a common mortar, with about twice as much sand; for coating walls exposed to cold and wet, the common proportions are 3 of sand to 2 of cement, and for walls exposed to extreme dryness or heat, about 2½ or 3 of sand to 1 of cement; for facing cistern work, water frontages, &c., nothing but cement and water should be employed.

This cement, under the name of compo, or Roman cement, is much employed for facing houses, water-cisterns, setting the foundations of large edifices, &c.

CEMENT, PLUMBER'S. *Prep.* Melt black rosin 1 lb., then stir in brickdust 1 to 2 lb. Sometimes a little tallow is added.

CEMENT, ROMAN. Genuine Roman cement consists of *puzzolene*, (a ferruginous clay from Puteoli, calcined by the fires of Vesuvius,) lime, and sand, mixed up with soft water. The only preparation which the puzzolene undergoes is that of pounding and sifting; but the ingredients are occasionally mixed up with bullock's blood and oil, to give the composition more tenacity.

CEMENT, SEAL ENGRAVER'S. Common resin and brickdust melted together.

Use. To fix the pieces of metal while cutting, and also to secure seals and tools in their handles. It grows harder and improves every time it is melted.

CEMENT, TURNER'S. Pitch, rosin, and brickdust melted together.

CEMENT, WATER. *Prep.* I. Good gray clay 4 parts; black oxide of manganese 6 parts; good limestone, reduced to powder by sprinkling it with water, 90 parts; mix, calcine, and powder.

II. Mix white iron ore (manganese iron ore) 15 parts, with lime 85 parts; calcine and powder as above. Both this and the preceding must be mixed up with a little sand for use. A piece thrown into water will rapidly harden.

III. Fine clean sand 1 cwt.; quicklime in powder 28 lbs.; bone ashes 14 lbs. For use, beat it up with water as quickly as possible.

CEMENT, WATERPROOF, (OF DIHL.) Pure clay, dried by a gentle heat, and powdered, mixed up to the consistency of a paste with boiled linseed oil.

Remarks. It may be colored by adding a little red or yellow ochre, or any similar pigment. It is used to cover the fronts of buildings, roofs of verandas, &c. It may be thinned with turpentine.

CEMENTATION, (in Metallurgy.) The operation of surrounding a solid body with powder or some other body, and in this state exposing it to the action of heat. Steel and porcelain undergo cementation.

CERATES. Unctuous preparations possessing a consistence intermediate between ointments and plasters. The term is derived from Cera, wax, because that is the ingredient on which their solidity mainly depends.

In the preparation of cerates, the oils and fats used should be perfectly fresh, and the wax unadulterated. It is a general custom with the druggists to use a less quantity of wax than what is required to give the compound a proper consistence, and in many cases it is omitted altogether, and its

place supplied by hard suet or stearine, and frequently rosin. Lard is also very generally substituted for olive oil. The operation of melting the ingredients should be performed in a water or steam bath, and the liquid mass should be assiduously stirred until cold.

CERATE, BLISTERING. *Syn.* CERATE OF SPANISH FLIES. CERATUM CANTHARIDES. (P. L.) *Prep.* Spanish flies in fine powder ℥j; spermaceti cerate ℥vj; soften the cerate by heat, then carefully mix in the powdered flies.

Use. To keep blisters open, and as a mild stimulant. Its use is sometimes, however, attended by strangury and other disagreeable symptoms. A blister on the scalp, dressed for 4 days with this cerate, was followed by the head swelling to an alarming size, an œdematose erysipelas over the face and scalp to the occlusion of the eyes, and great fever. These symptoms were removed by the use of emollient fermentations and simple dressings. (A. T. Thompson.) Very probably the cerate contained euphorbium, which it derived from the powdered flies being adulterated with this substance. (See CANTHARIDES.)

CERATE, CALAMINE. *Syn.* CERATUM EPULOTICUM, (P. L. 1745.) CERATUM LAPIS CALAMINARIS, (P. L. 1788.) CERATUM CALAMINÆ, (P. L. 1836.) HEALING SALVE. TURNER'S CERATE. *Prep.* Prepared calamine (lapis calaminaris) and wax, of each lb. ss; olive oil f℥xvj. *Proc.* Mix the oil with the melted wax, and as soon as it begins to thicken, add the calamine and stir until cold.

Use. To dress excoriations, ulcers, burns, sore nipples, &c. It is drying and healing.

Remarks. On the large scale this cerate is usually made without a particle of wax. 4 lbs. of suet are melted with 3 lbs. of lard, and 3½ lbs. of calamine sifted in; the whole is then well mixed up for a few minutes, and after one minute's repose, it is poured off into another vessel, a little coarse sediment that has fallen to the bottom being left behind. It is then stirred until cold. In many cases nothing but lard and calamine are used.

CERATE, CALAMINE, (WITH MERCURY.) *Prep.* (CERATUM CALAMINÆ CUM HYDRARGYRO, P. C.) Calamine cerate lb. j; nitric oxide of mercury ℥j. *Proc.* Triturate the oxide until reduced to an impalpable powder, then add the cerate and thoroughly blend them together.

CERATE, CALOMEL. *Prep.* Simple cerate ʒvij; calomel ʒj; mix.

CERATE, CALOMEL, (COMPOUND.) Calamine cerate ℥ij; calomel ℥j; mix.

CERATE, CINCHONA. (Paris Codex.) Equal parts of extract of cinchona and simple cerate, mixed together.

CERATE, COMPOUND LEAD. *Syn.* GOULARD'S CERATE. CERATUM PLUMBI COMPOSITUM, (P. L.) *Prep.* Solution of diacetate of lead f℥iij; wax ℥iv; olive oil ½ pint; camphor ʒss. *Proc.* Add 8 oz. of the oil to the melted wax, and as soon as it begins to cool, add the solution of lead, and continue the stirring until cold; then add the camphor dissolved in the remaining portion of the oil.

Use. A cooling cerate for burns, excoriations, &c.

CERATE COMPOUND MERCURIAL. *Syn.* CERATUM HYDRARGYRI COMPOSITUM, (P. L.) *Prep.* Mercurial ointment and soap cerate, of each ℥iv; powdered camphor ℥j; mix.

Use. As a stimulant application to indolent tumors, and as a resolvent in enlarged joints, &c.

CERATE, COPPER. *Syn.* CERATUM CUPRI. *Prep.* Liquor of ammoniated copper 1 part; simple cerate 8 parts. *Proc.* Soften the cerate by heat, then add the cupreous solution, and stir until cold. (Swediaur.)

CERATE, COSMETIC. *Syn.* POMMADE EN CREME. *Prep.* Oil of almonds 5 oz.; white wax and spermaceti, of each ½ oz.; melt, add rose water 3 oz., and tincture of balsam of Mecca ¼ oz.; stir until cold.

CERATE, HEMLOCK. (CERATUM CONII, St. B. H.) Hemlock ointment 12 oz.; spermaceti 2 oz.; white wax 3 oz.; melt the last two, then add them to the first, softened by a gentle heat. Used for inveterate cancerous, scrofulous, and other sores.

CERATE, HONEY (CERATUM MELLIS, P. C.) Lead plaster and beeswax, of each 4 oz.; olive oil 6 oz.; melt and add honey 6 oz.

CERATE, KIRKLAND'S NEUTRAL. *Prep.* Lead plaster ℥viij; olive oil and prepared chalk, of each ℥iv; mix with heat and add sugar of lead ʒiij, dissolved in distilled vinegar f℥iv. Stir until cold. *Use.* As a cooling dressing for indolent ulcers.

CERATE, MARSHALL'S. *Prep.* Palm oil and calomel, of each 2 oz.; sugar of lead 1 oz.; ointment of nitrate of mercury 4 oz.; mix thoroughly by rubbing them together in a Wedgewood mortar.

CERATE, MERCURIAL. (CERATUM MERCURIALE, P. L. 1746.) Strong mercurial ointment and yellow wax, of each 6 oz.; lard 3 oz. Melt the wax and lard together, then stir in the ointment.

CERATE OF ACETATE OF LEAD. (CERATUM PLUMBI ACETATIS, P. L.) Acetate of lead in fine powder ʒij; wax ℥ij; olive oil f℥viij; melt the wax in 7 oz. of the oil; then add the acetate of lead, separately rubbed down with the remaining oil; stir until cold.

Use. As a cooling cerate to burns, excoriations and inflamed sores.

CERATE OF ARSENIC. (CERATUM ARSENICI, P. U. S.) White arsenic in fine powder ℈j; simple cerate ℥j; mix.

CERATE OF NITRATE OF MERCURY. (CERATUM HYDRARGYRI NITRATIS, St. B. H.) *Prep.* Ointment of nitrate of mercury and simple cerate, equal parts; mix.

CERATE, OPIUM. (CERATUM OPII, DR. LAGNEAU.) *Prep.* Opium in fine powder ʒss; yelk of 1 egg; mix, then rub it up with simple cerate ℥ij.

CERATE, QUININE. (CERATUM QUINIÆ, F. H.) Sulphate of quinine 1 part; simple cerate 10 parts; mix well.

CERATE, RESIN. *Syn.* YELLOW BASILICON. BASILICON CERATE. CERATUM CITRINUM, (P. L. 1745.) C. RESINÆ FLAVÆ, (P. L. 1788.) CERATUM RESINÆ, (P. L. 1809, 1824, and 1836.) *Prep.* Yellow resin and wax, of each lb. j; melt; then add olive oil f℥xvj. Stir until cold.

Remarks. This cerate is a mild stimulant, de-

tergent, and digestive application; and is employed to dress foul and indolent ulcers.

The above is the form of the Lond. Ph., but the basilicon of the shops is seldom, if ever, made in this manner. The following forms are those commonly used on the large scale, but the product is inferior to the P. L.

II. Yellow resin 10 lbs.; beeswax 2 lbs.; linseed oil 7 lbs.; melt together and stir until cold.

III. As last, but use nut oil for linseed oil.

IV. Nut oil 1 gall.; beeswax 5 lbs.; yellow resin 14 lbs.

V. Lard (common) and linseed oil, of each 3 lbs.; yellow resin 9 lbs.; mix as before.

CERATE, ROSE. *Syn.* LIP SALVE. (CERATUM ROSATUM, P. Cod.) Oil of almonds 1 lb.; white wax ½ lb.; alkanet root 1 oz.; melt and digest until sufficiently colored, strain, and when cooled a little, add otto of roses (24 drops) to perfume.

CERATE, SAVINE. (CERATUM SABINÆ, P. L.) *Prep.* Lard lbs. ij; savine leaves lb. j; wax ℥viij. *Proc.* Melt the wax and lard, and boil the leaves in the mixture, then strain through a linen cloth.

Remarks. The preparation of this cerate requires caution, as the active principle of the savine being volatile, is injured by long boiling or too high a temperature. The leaves are usually boiled until they are crisp, but as this takes some time, the essential oil, and consequently the odor, is nearly all dissipated. A better plan is to express the juice from the leaves, and to add it to the wax and oil melted together, and just beginning to cool. As usually met with, this ointment has a deep green color, and the odor of the fresh plant, but neither of these is derived from the leaves, in the common process of making it. The first is caused by the addition of verdigris, and the latter by adding a little of the essential oil of savine to the compound when nearly cold. The cerate prepared according to the form of either of the British Colleges, has but a very pale green color, and that rapidly changes unless it be well covered up from the air. A greater quantity of color is got from the leaves by long digestion in the fat and wax in earthen vessels, at a moderate heat, than by hastily boiling. In this way a lively green is sometimes produced, but it rapidly changes.

The following forms are those that have been adopted by many druggists for the manufacture of this cerate.

II. Lard and suet, of each 6 lbs.; yellow wax 2 lbs.; melt them together in an earthen vessel; then add 2 oz. of distilled verdigris, previously rubbed down smooth in a mortar, with an equal weight of sweet oil; strain while hot into a large earthen pot, and when cooled a little, add 1 oz. of oil of savine; stir till cold.

III. Savine leaves 4 lbs.; yellow wax 2 lbs.; lard 8 lbs.; boil until the leaves become crisp; then strain, and add, of lively-colored green ointment 5 lbs.; and when cooled a little, 3 drs. of oil of savine. Stir briskly until cold. *Prod.* 13½ lbs.

The practice of coloring this cerate with verdigris, which is next to universal, cannot be too severely censured, as its therapeutic action is thereby altered. The copper may be detected by burning down a little in a platinum or Hessian crucible, washing out the ashes with a little dilute acid, placing the liquor in a glass tube, and pouring thereon liquid ammonia. When a blue color, ammoniureted copper will be produced, if copper be present.

Use. To keep blisters open.

CERATE, SOAP. (CERATUM SAPONIS, P. L.) *Prep.* Boil litharge ℥xv in distilled vinegar 1 gallon until dissolved, stirring continually; then add of Castile soap ℥x; boil again until the moisture be entirely evaporated: then add gradually, wax ℥xiiss, and olive oil 1 pint, previously melted together.

Remarks. Unless the above instructions be exactly followed in every particular, the process will miscarry. When this is the case, it will be found that the cerate on cooling will separate into two portions, and be full of hard gritty particles. To prevent this, care should be taken to use soap of the best quality. When once this mishap occurs, no boiling or stirring in the world will remove it. The only remedy is the addition of a little more soap, previously melted with some water, and again evaporating to a proper consistence. A small quantity of liquor of potassa will also have the same effect.

The color and consistence of this cerate wholly depend upon the length of time it is kept heated after the addition of the oil and wax. As evaporation proceeds, so do the color and consistence increase. Its usual color is that of a lively pale chocolate-brown, but occasionally it is much paler. This arises from its containing moisture, which, by stirring, reduces the color. The following form may be used on the large scale.

II. Distilled vinegar 6 galls.; litharge 5 lbs.; soap 3¼ lbs.; yellow wax 4½ lbs.; olive oil 6 pints. Mix as above. (Good nut or poppy oil may be used for olive oil.)

Uses. Soap cerate is used as a cool dressing for scrofulous swellings, &c. It may be spread on linen and applied like a plaster.

CERATE, SIMPLE. *Syn.* OIL AND BEESWAX. SIMPLE DRESSING. CÉRAT SIMPLE, (*Fr.*) CERATUM SIMPLEX, (P. L. 1824.) CERATUM, (P. L. 1809 and 1836.) *Prep.* Olive oil f℥iv; yellow wax ℥iv; mix by heat, and stir until cold.

Remarks. This is the ceratum of the "London Pharmacopœia." It is used as a simple emollient dressing for excoriations and sores. The ceratum simplex of the Scotch College is spermaceti cerate. Simple cerate is but little used, preference being given to the next preparation.

CERATE, SPERMACETI. *Syn.* WHITE LIP SALVE. CERAT DE BLANC DE BALEINE, (*Fr.*) SIMPLE CERATE, (P. E.) CERATUM ALBUM, (P. L. 1745.) C. SPERMATIS CETI, (P. L. 1788.) CERATUM CETACEI, (P. L. 1809, 1824, 1836.) *Prep.* Spermaceti ℥ij; white wax ℥viii; olive oil 1 pint. Melt together and stir assiduously until cold. *Use.* As a soft cooling dressing.

Remarks. As soon as the materials are melted, they should be moved from the fire, strained into a clean vessel, and stirred until cold. To facilitate the cooling, the vessel may be placed in cold water or a current of cold air. This will render the product both whiter and finer than when allowed to cool by itself. The operation of melting should be performed in a water bath. On the large scale

lard or suet is substituted for oil, by which means less wax is required. The following is a good form where a cheap article is wanted.

II. Clarified mutton suet 5½ lbs.; white wax and spermaceti, of each ¾ lb. As above.

CERATE, SULPHUR. (CERATUM SULPHURATUM, P. Cod.) Washed sulphur 2 parts; cerate of Galen 7 parts; almond oil 1 part. Mix.

CERATE, SULPHURET OF MERCURY. (CERATUM RUBRUM, P. Cod.) Yellow wax, lard, and yellow resin, of each ℥j; red sulphuret of mercury gr. xxx. Mix.

CERATE, ZINC, AND LYCOPODIUM. (CERATUM ZINCI CUM LYCOPODIO, Hufeland.) Simple cerate ʒiv; oxide of zinc and lycopodium, in powder, of each gr. xv. Mix.

CERIUM. A metal discovered in 1803 by Hisinger and Berzelius, in a mineral named cerite. It is obtained in combination with a metal called by Mosander Lantanium. The mixed oxides may be procured by dissolving calcined and powdered cerite in nitro-muriatic acid, filtering, neutralizing with pure potassa, and then precipitating with tartrate of potassa. The powder that falls down is next washed and calcined.

The mixed oxides may be separated by solution in nitric acid, evaporation, and calcination. The mass previously powdered is then to be digested in water containing 2% of nitric acid; the undissolved portion is the oxide of cerium. The solution contains the *oxide of lantanium*, which may be obtained as a carbonate by adding a solution of carbonate of potassa.

The combination of these metals is but little known, and is now the subject of investigation by several eminent foreign chemists. Various compounds of these metals with the acids, sulphur, and chlorine have been formed.

CETENE. A colorless oily-looking liquid, obtained by repeatedly distilling ethal with glacial phosphoric acid. It is inflammable and soluble in alcohol and ether.

CETINE. *Syn.* PURE SPERMACETI. *Prep.* Dissolve spermaceti in boiling alcohol, and collect the crystals that deposite on cooling. *Prop.* Bright pearly crystals; melts at 120°; sublimes at 670°.

CHAIRS. The black leather work of chairs, settees, &c., may be restored by first washing off the dirt with a little warm soap and water, and afterwards with clean water. The brown and faded portions may now be restained by means of a little black ink, or preferably *black reviver*, and when this has got thoroughly dry, they may be touched over with white of egg, strained and mixed with a little sugar-candy. When the latter is nearly dry, it should be polished off with a clean dry brush.

A similar process will revive ladies' and gentlemen's dress boots and shoes.

CHALK. *Syn.* EARTHY CARBONATE OF LIME. Perhaps there is no one thing better known, or more universally distributed throughout England, than chalk. It is here largely used in the manufactures, the arts, and in medicine; and it forms an important geological feature of the country. It was the hills of chalk, the white cliffs of England, that conferred on it the name of Albion, (from *albus* or *albens*, white.) The chalk formation ranges over a great portion of the country, and in many cases obtains an elevation of nearly 1000 feet above the level of the sea. There are various kinds of chalk, principally distinguished by their color.

CHALK, PRECIPITATED. *Syn.* CRETA PRECIPITATA. *Prep.* (*Calcis Carbonas Precipitatum*, P. D.) Add a solution of carbonate of soda in 6 times its weight of water, to another of muriate of lime. Wash the precipitate repeatedly with distilled water.

Use. Precipitated chalk is ordered by the Irish College to be used in the preparation of "quicksilver with chalk." It is also frequently used as an ingredient in aromatic confection, cretaceous tooth-powder, &c., and is preferable in every case where chalk is ordered, and expense is not an object.

CHALK, PREPARED. *Syn.* CRETA. CALCIS CARBONAS FRIABILIS, (P. L.) FRIABLE CARBONATE OF LIME, (P. E.) CRETA ALBA, (P. D.) *Prep.* Rub chalk ℔j with sufficient water, added gradually, until reduced to a very fine powder; then put this into a large vessel with water, agitate well, and, after a short interval, pour off the supernatant water, *still turbid*, into another vessel, and let the suspended powder subside. In the same way shells are prepared, after being first freed from impurities, and washed with boiling water (P. L.)

Remarks. On the large scale the chalk is ground in mills, and the deposite made in large reservoirs. It is now seldom prepared by the druggist.

Use. Prepared chalk is used in medicine as an absorbent, antacid, and desiccant. It forms a valuable dusting powder in excoriations, ulcers, &c., especially in children. It is administered in dyspepsia, heartburn, acidity of the stomach, &c. In diarrhœa, depending on acidity or irritation, it is very serviceable, either alone, or combined with aromatics, astringents, or opium. *Dose.* 10 grs. to a spoonful. The precipitated chalk is preferable when it can be obtained pure, and either that or the prepared chalk must alone be used in medicine. The latter is, however, the cheaper of the two, and is consequently the one more generally used.

Pur. Precipitated chalk is frequently adulterated, and, in many cases, the article sold as such does not contain *one particle* of carbonate of lime. The following extract from a letter published in the "Annals of Chemistry," will throw some light on this subject. The truth of Mr. Bartlett's assertions I can testify to. "An article has been offered and purchased by both wholesale and retail druggists, (in one instance, I believe, to the extent of a ton weight,) under the name of precipitated chalk, at 8*d.* or 10*d.* per lb. instead of 1*s.* 4*d.* or 1*s.* 6*d.*, the price of the genuine article. This article appears beautifully white and flocculent, having all the appearance of the genuine, but is nothing more than *pure sulphate of lime.*" "It is well known that the carbonic acid gas of the soda-water manufacturer is obtained from whiting, and that it is disengaged therefrom by sulphuric acid. A short time since it was inquired of us to what purpose the pappy residuary mass of sulphate of lime and excess of whiting could be applied in

chemistry? At the time we were unable to furnish a satisfactory reply; the impression of our querist being that, on account of the secrecy observed in removing it, he had no doubt the uses to which it could be applied involved a good profit. We think Mr. B.'s letter may be received as a clue to the uses of this residue. Creta precipitata should be entirely soluble in acetic acid, with effervescence; the sulphate of lime, on the contrary, is insoluble." (Ann. Chem. and Pract. Pharm.)

The following are the tests of purity mentioned in the London Phar.:—"Entirely soluble in dilute muriatic acid, with effervescence. After this solution has been boiled, no precipitate is produced when ammonia is dropped in."

CHAMBERLAIN'S RESTORATIVE PILLS. A quack medicine, composed of cinnabar, sulphur, and sulphate of lime, made into pills with mucilage.

CHAMBERLIGHT, IMPROVED. Take a common cylindrical ointment pot, a 2 oz.-size in the winter, (in the summer a smaller one;) fill this with any kind of fat, as the waste fat from the kitchen for instance. Trim by about ½ an inch of the common wax-wick, sold at the tallow-chandler's, simply stuck into a thin slice of a wine-bottle cork, upon which place a strip of stout filtering paper, about half the diameter of the cork in breadth, and a diameter and a half in length. It need not be quite so broad, but it must be at least the length stated. The reason for using the bibulous paper is, that it feeds the wick properly; without it, or some such contrivance, it will not burn. Remove with the handle of a teaspoon sufficient of the fat to allow the cork to be a little below the surface, and then place the fat so removed over the cork and paper, neatly spreading it to make an even surface. The light is now prepared. (Ann. of Chem.)

CHAMOMILE DROPS. *Prep.* Dissolve 1 oz. of essential oil of chamomile in 1 pint of rectified spirit of wine. *Use.* As a stomachic and stimulant. *Dose.* 5 to 30 drops; ½ an oz., shaken with about 1 pint of pure water, forms an excellent chamomile water.

CHAPPED HANDS AND LIPS. The application of a little cold cream, pomatum, spermaceti ointment, lard, or any similar article, will generally prevent chaps and chilblains on the lips and hands. Persons employed in oil works, or about oil, and who have consequently their hands continually imbued therewith, never suffer from these things. A little oil or unguent of any kind, well rubbed over the hands on going to rest, (removing the superfluous portion with a cloth,) will not only preserve them from cold, but render them beautifully soft and white. It is said that a favorite actress, celebrated for the beauty of her hands, covers them nightly with the flare of a calf or lamb with the fat attached, over which is drawn a glove of leather. (What inconvenience and even pain will not persons suffer to gratify their pride!)

CHARCOAL. A peculiar and well-known black substance, obtained from organic matter, by calcination in close vessels. There are two kinds of charcoal met with in commerce, viz., animal (bone) and vegetable, (wood.)

I. (*Animal charcoal.*) The preparation of this kind of charcoal has been already explained.

II. (*Vegetable charcoal.*) *Prep.* This is prepared for fuel by cutting pieces of wood, of from 1 to 3 or 4 inches in diameter, into lengths, varying from 1 to 2 or 3 feet, forming them into a conical pile, covering them with turf or clay, to exclude the air, leaving only 2 or 3 small holes at the bottom for lighting the wood, and a few others still smaller at top to admit the escape of the smoke. The wood is now kindled, and the combustion allowed to proceed slowly for 8 or 10 days, more or less, until the volatile matter of the wood be driven off, when the air holes are stopped up with clay, and the further combustion of the pile arrested. The whole is then allowed to remain until cold, before it is broken up. In case of very high winds occurring during the carbonization of the wood, the holes to windward are stopped up with clay or earth, to prevent the mass burning too rapidly.

The charcoal employed in the manufacture of gunpowder is burnt in close iron cylinders, and has hence received the name of "cylinder charcoal." For this and other nice purposes, it is essential that the last portion of the tar and vinegar be suffered to escape, and reabsorption of the crude vapors prevented, by cutting off the communication between the cylinders and the condensing apparatus, as without this precaution, on the fire being withdrawn, this would certainly take place, and the product be much reduced in quality. The dogwood, alder, and willow are those used for making charcoal at Waltham Abbey. The Dutch white willow, and after that the Huntingdon willow, are said to yield the best charcoal for gunpowder. (Lieut.-Col. Moody.)

It has been stated, that in charring wood, a portion of it is sometimes converted into a species of pyrophorous. Perhaps this might have been the cause of the late dreadful explosion at the above works.

Uses, &c. Charcoal is used as a fuel, and in metallurgy for tempering metals. Reduced to powder, it is used to surround vessels and bodies required to retain their heat for some time. A coating of charcoal formed on piles and stakes of wood, by charring them, is frequently adopted to promote their preservation, as it is unchangeable by air and moisture. Powdered fresh-burnt charcoal restores tainted meat and putrid water, decolors vegetable solutions, and withdraws lime from sirups filtered through it. For both these purposes animal charcoal is best.

Charcoal varies in its qualities according to the substance from which it is prepared; that of the soft woods, as the willow or alder, is best for crayons, and for making gunpowder; that of the harder woods is used for fuel, or for a support for substances exposed to the flame of the blowpipe. Charcoal of animal substances has the greatest clarifying power. That made by a low red heat, not exceeding cherry red, has a dull surface, and is best for clarifying liquids, and probably for making gunpowder, and for fuel. If the heat be carried beyond this point, the charcoal acquires a brilliant surface, and is considerably inferior for clarifying, and probably for every other use.

Oak, beech, and hazel charcoal are those com-

monly sold in London for fuel. Willow charcoal is also occasionally found mixed therewith, and is frequently picked out for crayons, polishing copper-plates, for grinding, to make tooth-powders, poultices, &c. Chesnut charcoal is preferred by smiths for forging, as it not only burns slowly, but deadens as soon as the blast ceases. Areca-nut charcoal is preferred as a dentifrice, but that from the willow is commonly sold for it.

In medicine, charcoal is principally used as an antiseptic or disinfectant, either in the form of powder or made into a poultice. It has been given internally in dyspepsia, diarrhœa, dysentery, and heartburn, with advantage. *Dose.* 10 grs. to a tablespoonful, ad libitum. An ointment made with lard and charcoal has been employed in some skin diseases.

Ant. In cases of asphyxia, produced by respiring the fumes of burning charcoal, the treatment is similar to that described under carbonic acid.

If the person has been only so much exposed to the vapor as to stagger, on coming into the fresh air it goes off; but the head remains affected. When the exposure has been so long that sleepiness comes on, the patient should be immediately bled, cold water thrown upon the head, &c., and stimulating applications to the feet. There have been instances of recovery by these means, even when respiration had ceased, and some part of the animal heat had been lost. If life does not quickly return it will be highly proper to attempt artificial respiration. (See Asphyxia.) The most simple excitant in this species of asphyxia, is the passage into the nasal fossæ of a feather dipped in common vinegar. It is the means which has always first caused the muscular contractions indicating revival. (Gabriel Pelletan.)

Gilders, jewellers, copper-plate printers, braziers, &c., who use small open fires of burning charcoal, should endeavor to create a draught of air to carry off the fumes, and should take care to keep to "*windward*," (as sailors call it,) by which means they will avoid them. Vessels containing milk of lime have been employed to absorb the gas, but their action must necessarily be very limited. The only certain remedy is thorough ventilation. This should be adopted, even at slight personal inconvenience in other respects.

CHARCOAL CRAYONS. *Prep.* Saw the finest-grained, softest, and blackest pieces of charcoal, into slips of the size required, put them into a pipkin of melted wax, and allow them to macerate over a slow fire for half an hour, then take them out and lay them on blotting-paper to dry.

Remarks. The above process may also be employed for red and black chalk. Drawings made with these crayons are very permanent, and if warmed slightly on the wrong side, the lines will adhere and become as durable as ink. These crayons may also be made by simply shaping the charcoal with a knife. Willow charcoal should be used for this purpose.

CHARCOAL, LARDNER'S PREPARED. *Prep.* Mix well together 1 oz. of finely-ground charcoal with 3 oz. of prepared chalk. *Use.* As a tooth-powder.

CHARRING, SURFACE. The operation by which the surface of wood is carbonized, to prevent its decay on exposure to air and moisture. *Stakes and piles* are generally thus treated before they are driven into the ground. *Casks* are charred on the inside by coopers when they are intended to hold water. In both these cases the fire is applied directly to the wood. A new method has, however, been lately employed with apparent success. This consists in washing the wood with the strongest oil of vitriol. In this way, not only the outer surface, but the surface of all the cracks and holes, gets carbonized, which is not the case when heat is employed.

CHEESE. The curd of milk compressed into a solid mass.

Qual., &c. This well-known substance has been objected to as an article of diet, but without sufficient reason. That the inferior kinds of cheese are not very digestible must be acknowledged, and when eaten in quantity may overload the stomach; but when the quality is good, and the digestive organs are in a healthy condition, it must evidently prove not only wholesome but very nutritious. Like all other food, cheese digests more readily when well masticated, and the neglect of this precaution is one reason why it frequently disagrees with delicate stomachs. It is rendered more agreeable to most palates by toasting, but becomes less digestible by that operation. The basis of cheese is caseine or coagulated curd, a proteine substance; it therefore cannot fail to prove nutritious, provided it be properly digested. Cheese-curd, carefully freed from water and milk by expression, and the addition of salt, is a mixture of caseine and butter; it contains all the phosphate of lime, and part of the phosphate of soda, of the milk. (Liebig.) When taken as a condiment, especially when rich and old, it powerfully promotes the secretion of the saliva and gastric juice, and thereby aids the stomach in performing its proper functions.

Principles of Cheesemaking. When any vegetable or mineral acid is added to milk, and heat applied, a coagulum is formed, which, when separated from the liquid portion, constitutes cheese. Neutral salts, earthy and metallic salts, sugar, and gum Arabic, as well as some other substances, also produce the same effect; but what answers best is *rennet*, or the mucous membrane of the last stomach of the calf. Alkalis dissolve this curd at a boiling heat, and acids again precipitate it. The solubility of cheese in milk is occasioned by the presence of alkaline phosphates and of free alkalis. In fresh milk these may be readily detected by the property it possesses of restoring the color of reddened litmus paper. The addition of an acid neutralizes the alkali, and so precipitates the curd in an insoluble state.

"The acid indispensable to the coagulation of milk, is not *added* to the milk in the preparation of cheese, but it is *formed in the milk* at the expense of the milk-sugar present. A small quantity of water is left in contact with a small quantity of a calf's stomach for a few hours, or for a night; the water absorbs so minute a portion of the mucous membrane as to be scarcely ponderable; this is mixed with milk; its state of transformation is communicated, (and this is a most important circumstance,) *not to the cheese but to the milk-sugar*, the elements of which transpose themselves into lactic acid, which neutralizes the al

kali, and thus causes the separation of the cheese. By means of litmus paper the process may be followed and observed through all its stages; the alkaline reaction of the milk ceases as soon as the coagulation begins. If the cheese is not immediately separated from the whey, the formation of lactic acid continues, the fluid turns acid, and the cheese itself passes into a state of decomposition.

"When cheese-curd is kept in a cool place, a series of transformations take place, in consequence of which it assumes entirely new properties; it gradually becomes semi-transparent, and more or less soft throughout the whole mass; it exhibits a feebly acid reaction, and develops the characteristic caseous odor. Fresh cheese is very sparingly soluble in water, but after having been left to itself for two or three years, it becomes (especially if all the fat be previously removed) almost completely *soluble in cold water*, forming with it a solution, which, like milk, is coagulated by the addition of the acetic or mineral acids. The cheese, which while fresh is insoluble, returns during the maturation, or ripening, as it is called, to a state similar to that in which it originally existed in the milk. In those English, Dutch, and Swiss cheeses which are nearly inodorous, and in the superior kinds of French cheese, the caseine of the milk is present in its unaltered state. The odor and flavor of the cheese is owing to the decomposition of the butter; the non-volatile acids, the margaric and oleic acids, and the volatile butyric acid, capric and caproic acids, are liberated in consequence of the decomposition of glycerine, (the sweet principle of oils, or, as it might be termed, the sugar of oils.) Butyric acid imparts to cheese its characteristic caseous odor, and the differences in its pungency or aromatic flavor depend upon the proportion of free butyric, capric, and caproic acids present.

"The transition of the insoluble into soluble caseine depends upon the decomposition of the phosphate of lime by the margaric acid of the butter; margarite of lime is formed while the phosphoric acid combines with the caseine, forming a compound soluble in water.

"The bad smell of inferior kinds of cheese, especially those called meager or poor cheeses, is caused by certain fetid products containing sulphur, and which are formed by the decomposition or putrefaction of the caseine. The alteration which the butter undergoes, (that is, in becoming rancid,) or which occurs in the milk-sugar still present, being transmitted to the caseine, changes both the composition of the latter substance and its nutritive qualities.

"The principal conditions for the preparation of the superior kinds of cheese, (other obvious circumstances being of course duly regarded,) are *a careful removal of the whey, which holds the milk-sugar in solution, and a low temperature during the maturation or ripening of the cheese.*" (Liebig's Lectures.)

Cheese differs vastly in quality and flavor, according to the method employed in its manufacture, and the richness of the milk of which it is made. It is thought by some that the pasture, or the food on which the cows feed, exercises considerable influence upon the quality of the cheese; but this influence, if any, is very slight and subordinate. As the cheese made on the same farm does not vary in any important degree, whether made in winter or summer, while the food must differ considerably from the luxuriance of vegetation at the one period, and its scantiness and the absence of flowering plants at the other. So long as the cows receive sufficient food of good quality, the precise description appears of little consequence. Much depends upon the richness of the milk, or the quantity of cream it contains, and consequently, when a superior quality of cheese is desired, cream is frequently added. This plan is adopted in the manufacture of Stilton cheese. The addition of a pound or two of butter to the curd for a middling size cheese, will also vastly improve its quality. To ensure the richness of the milk, it is of course necessary that the cow be not only properly fed, but be of a good breed, such as are commonly known as good milkers. The breeds cultivated in Alderney, Cheshire, Gloucester, North Wiltshire, Chedder, and Guernsey, deserve notice in this respect.

The taste and odor of cheese vary in almost every county of England, and even in portions of the same county, where the herbage is similar; it is therefore evident that the mode of manipulating and the quality of the milk must be the chief causes of the difference. Stilton, Chedder, Cheshire, and Gloucester, are among the most celebrated places or districts for its manufacture in England.

Cheese is generally made from the milk of cows, but occasionally from that of ewes, and sometimes, though more rarely, from the milk of goats.

Process of Cheesemaking. The materials employed in making cheese are *milk and rennet. Rennet* is the stomach of the calf, and may be used either fresh, or salted and dried. It is generally kept in the latter state, for the sake of preserving it good. The stomach is taken from the calf as soon as killed, and after being cleared of the curd always found in it, it is well salted both on the outside and in, and after draining for a sufficient time, it is stretched out upon a stick and dried. *The milk* may be of any kind, from the poorest skimmed-milk to that rich in cream, according to the quality of the cheese required. The poorest kind of cheese is made from the former, and the finer from the latter, to which cream is frequently added.

The materials being ready, the greater portion of the milk is put into a large tub, and the remainder sufficiently heated to raise the whole quantity to the temperature of new milk. The whole is then whisked together, the rennet added, and the tub covered over. It is now allowed to stand until completely turned, when the curd is struck down several times with the skimming-dish, after which it is allowed to subside. The vat covered with cheese-cloth is next placed on a "horse or ladder" over the tub, and filled with curd by means of the skimmer; the curd is pressed down with the hands, and more added as it sinks This process is repeated until the curd rises to about 2 inches above the edge. The cheese thus partially separated from the whey is now placed in a clean tub, and a proper quantity of salt added, or the salt is added to it without removing it from the vat, after which a board is placed over and under it, and pressure applied for 2 or 3 hours.

The cheese is next turned out and surrounded by a fres : cheese-cloth, and pressure again applied for 8 or 10 hours, when it is commonly removed from the press, salted all over, and pressed again for 15 to 20 hours. The quality of the cheese especially depends on this part of the process, as if any of the whey be left in the cheese, it will not keep, but will rapidly become bad-flavored. Before placing it in the press the last time, the edges should be pared smooth and sightly. It now only remains to wash the outside of the cheese in warm whey or water, wipe it dry, and color it with annotto as is usually done.

There are several methods of collecting the curd adopted, and as the flavor of the cheese varies accordingly, it is as well to notice them. One way is to break the curd early, and to remove the whey as soon as possible; another plan is to gather it with the hands very gently towards the sides of the tub, letting the whey run off through the fingers until it becomes cleared, and ladling it off as it collects. A third method is to remove it as quickly as possible with the curd-skimmer. Of these the second plan is said to be the best, as it preserves the oily particles, many of which are lost by the other methods.

The cheese being made, it now only remains to place it in a proper situation to mature or ripen. In England a *cool, and slightly damp cellar*, is commonly regarded as the best to bring it forward. The temperature should on no account exceed 50° at any portion of the year, but an average of about 45° is preferable when it can be procured. A place exposed to sudden changes of temperature is unfit for storing cheese. "The quality of Rochefort cheese, which is prepared from sheep's milk, and is very excellent, depends exclusively upon the places where the cheeses are kept after pressing and during maturation. These are cellars, communicating with mountain grottoes and caverns, which are kept constantly cool, at about 41° to 42° Fahr., by currents of air from clefts in the mountains. The value of these cellars as storehouses varies with their property of maintaining an equable and low temperature. Giron (Ann. de Chim. et Phys. xlv. 371) mentions that a certain cellar, the construction of which had cost 480*l*., (12,000 francs,) was sold for 8,600*l*., (215,000 francs,) being found to maintain a suitable temperature, a convincing proof of the importance attached to temperature in the preparation of these superior cheeses." (Liebig's Lectures.)

It will thus be seen that very slight differences in the materials, the preparation, or the storing of cheese, will materially influence the quality and flavor. The richness of the milk,—the addition to or subtraction of cream from the milk,—the separation of the curd from the whey with or without compression,—the salting of the curd,—the collection of the curd, either whole or broken, before pressing,—the addition of coloring matter, as annotto or saffron, or of flavoring,—the place and method of storing,—and the length of time allowed for maturation, all tend to alter the taste and odor of the cheese, in some or other particular, and that in a way readily perceptible to the refined palate. The nature of the pasture or the food on which the cows are fed, as well as their particular breed, no doubt also tends in some slight degree to promote the same diversity of flavor and quality. No other alimentary substance appears to be so materially affected by slight variations in the quality of the materials from which it is made, or by such apparently trifling differences in the methods of preparing it.

Var. There are several varieties of cheese met with in trade, differing from each other in quality or flavor; and these are generally distinguished by the names of the places where they have been manufactured, and sometimes, though more rarely, by their flavor, or the milk from which they are manufactured. Three divisions may however be made, depending upon the quality of the materials, each of which is well marked, and to one or the other all kinds of cheese belong. These are *skimmed-milk, raw-milk*, and *cream cheeses*, the names of which respectively express the materials of which they are made. The following are the principal cheeses met with in Europe.

Brickbat cheese, made in Wiltshire of new milk and cream. This name is given to it from its being made into forms resembling brickbats.

Chedder cheese, named after the place where it is made. This is a fine kind of cheese, with a spongy appearance, the eyes or vesicles of which contain a rich oil. It is made up into round thick cheeses of considerable size.

Cheshire cheese. The best Cheshire cheese is made of new milk without skimming, the morning's milk being mixed with that of the preceding evening, previously warmed, so that the whole may be brought to the heat of new milk. To this the rennet is added, in less quantity than is commonly used for other kinds of cheese. On this point, much of the flavor and mildness of the cheese is said to depend. A piece of dried rennet, of the size of half-a-crown, put into a pint of water over night, and allowed to stand until the next morning, is sufficient for 18 or 20 gallons of milk. The curd is next broken down and separated from the whey, after which it is put into a cheese vat and pressed very dry. It is next broken very small with the hands, and mixed with a proper quantity of salt, and about half its weight of curd, from yesterday's batch, kept for the purpose. The mixed curds are now pressed tightly with the hands, into a cheese-vat, previously lined with cheese cloth, pressed for 4 or 5 hours, then taken out, turned, and again put into the press and left for the night. It is taken out next morning, well salted, and left until the salt is quite melted, when it is wiped dry, placed in a dry, cool situation, and turned every day until it becomes fit for the market.

"If the milk be set together very warm, the curd will be firm: in this case, the usual mode is to take a common case-knife, and make incisions across it, to the full depth of the knife's blade, at the distance of about 1 inch; and again crosswise in the same manner, the incisions intersecting each other at right angles. The whey rising through these incisions is of a fine pale green color. The cheese-maker and two assistants then proceed to break the curd: this is performed by their repeatedly putting their hands down into the tub; the cheese-makers, with the skimming-dish in one hand, breaking every part of it as they catch it, raising the curd from the bottom, and still breaking

it. This part of the business is continued till the whole is broken uniformly small; it generally takes up about 40 minutes, and the curd is then left covered over with a cloth for about half an hour to subside. If the milk has been set cool together, the curd, as before mentioned, will be much more tender, the whey will not be so green, but rather of a milky appearance." (Cheshire County Agricultural Report.)

Cream cheese. This is either made of the "strippings," (the last of the milk drawn from the cow at each milking,) or of a mixture of milk and cream. It is usually made up into small pieces, and a gentle pressure, as that of a 2 or 4 lb. weight, applied to press out the whey. After twelve hours, it is placed upon a board or wooden trencher, and turned every day, until dry. In about three weeks, it will be ripe. Nothing but raw cream, turned with a little rennet, is employed, when a *very rich* cheese is wanted. A little salt is generally added, and frequently a little powdered lump sugar. The vats employed for cream cheeses are usually square, and of small size.

Cottenham cheese, named from the town where it is made, is a species of cream cheese, superior to Stilton, from which it also differs in shape, being flatter and broader than the latter. Its superiority is said to be derived from the rich grasses growing on the fens of Cambridgeshire.

Derbyshire cheese is a small rich variety, of a pale color, very similar to the following:

Dunlop cheese, named after a town in Ayrshire, where it was originally made. It is very rich, white, and buttery, and is made up into round forms, weighing from ¼ cwt. to ½ cwt. It is now made very generally throughout the whole of Scotland.

Dutch cheese. This is very commonly met with in England, and is readily distinguished by its globular form. The cheeses made at Edam are very highly salted; those made at Gouda are less so. The common size of these cheeses is from 5 to 14 lbs.

French cheese. The Rochefort and the Neufchatel are the most esteemed.

German cheese. The only kind made in Germany of any celebrity, is the *Westphalian,* which derives its peculiar flavor from the curd being allowed to become partially putrid before being pressed. It is made up into small balls or cylinders, of about a pound weight, somewhat resembling in shape the pounds of butter in some parts of the west of England.

Gloucester cheese. There are two varieties of this cheese: *the single,* made of milk deprived of part of its cream, and *the double,* made of milk retaining the whole of the cream. The best kind has a fine mild taste; a semi-buttery consistence, without being friable, and is made up into large round flattish forms.

Green or sage cheese is made from milk previously mixed with the juice or an infusion or decoction of sage leaves, to which some marygold flowers and parsley are frequently added.

Lincolnshire cheese is made of new milk and cream, and formed into pieces about 2 inches thick. It is very soft, and without great care, will not keep over two months. Some persons sprinkle dry salt over them, when they will keep better.

Norfolk cheese. This is remarkable for the curd being dyed yellow, with annotto or saffron. It is of very good but not superior quality, and usually weighs from ¼ to ½ cwt.

Neufchatel cheese. After Rochefort cheese, this is the best manufactured in France. It is made of cream, and seldom exceeds 5 or 6 oz. in weight.

Parmesan cheese. This is made at Parma, and in other parts of Lombardy. Its peculiar flavor is said to arise from the luxuriance of vegetation in that part of Italy, and from the great abundance of aromatic flowers in the pastures. It is more probable, however, that the application of heat to the curd of the milk, to harden it, as is the common practice in Lombardy, is the true cause of its flavor. The following method is said to produce a cheese equal to the best Parmesan:

"Let the day's milk be heated to the degree of 120° of Fahrenheit, then removed from the fire until all motion ceases, put in the rennet, allow an hour for the coagulation, after which set the curd on a slow fire until heated to 150°, during which the curd separates in small lumps. A few pinches of saffron are then thrown in, together with cold water sufficient to reduce it instantly to a bearable heat, when the curd is collected by passing a cloth beneath it, and gathering it up at the corners. Place the curd in a circle of wood without a bottom; lay it on a table covered by a round piece of wood, pressed down by a heavy stone. The cheese will acquire sufficient consistence in the course of a night to bear turning, when the upper side is to be rubbed with salt, and continued alternately for forty days."

"In Italy, the outer crust is next cut off, and the new surface varnished with linseed oil; but that may well be omitted, as well as coloring one side of it red."

Polish cheese. This is generally of very inferior quality, and made in imitation of English cheese.

Rochefort cheese. This is made of ewe's milk, and is the best kind prepared in France. It resembles Stilton, but is scarcely of equal richness or quality. By kneading the gluten of wheat with a little salt, and a small portion of a solution of starch, it acquires the taste, smell, and unctuosity of cheese; so that after it has been kept a certain time, it is not to be distinguished from the celebrated Rochefort cheese, of which it has all the pungency. (Roulle.) See the remarks on the Principles of Cheesemaking, above.

Russian cheese. This is generally of a very inferior kind. The best sort is that made in imitation of English cheese; the commoner kinds merely consist of salted curd, placed in a bag and wrung dry, by two persons twisting the ends in opposite directions. It is usually not only bad tasted, but dirty.

Slipcoat or soft cheese is a very rich white cheese, somewhat resembling butter, made for present use.

Stilton cheese, named after the town where it was originally made, is at once the richest and finest variety of cheese manufactured in England. It is prepared from raw milk, to which cream taken from other milk is added. Its shape is peculiar, being generally twice as high as it is broad. It is generally twice the price of Cheshire or dou-

ble Gloucester. Like wine, this cheese is vastly improved by age, and is therefore seldom eaten before it is two years old. A spurious appearance of age is sometimes given to it by placing it in a warm damp cellar, or by surrounding it with masses of fermenting straw, or rotten cow-dung.

Suffolk cheese is made from skimmed milk, and is usually shaped into round flat forms, weighing from 24 lbs. to 30 lbs. each. It much resembles the skimmed or "scald" milk cheese made in Devonshire.

Swiss cheese. The principal cheeses made in Switzerland are the Gruyère, or Jura, and the *Schabzieger*, or *green cheese.* The latter is flavored with melilot.

Wiltshire cheese resembles poor Cheshire or Glo'ster. The outside is generally covered with red paint, made by mixing up ruddle or red ochre with whey, and laying it in with a brush.

Yorkshire cheese is a fine variety of cream cheese, but will not keep.

Concluding Remarks. It is surprising that cheese is not more frequently made an article of domestic manufacture, especially by housewives resident in the country. The operations of cheese-making are all exceedingly simple, and not at all laborious, and will, in most cases, amply repay the outlay for the milk. With the peasantry, who can usually procure a few gallons of milk from the houses of the farmers for whom they work, it really appears a want of common foresight, not to provide themselves with a few pounds of this wholesome and nutritious article, which is looked upon by some of those roughly-fed children of the soil, as a luxury beyond their reach. In a family where cheese is generally relished by the majority of the members, it becomes quite as necessary to have home-made cheese as home-made bread, and there is scarcely a portion of the United Kingdom where milk may not be obtained, during the summer months, at such a price as to render it important in a pecuniary point of view. Besides, cheese is not unfrequently colored with stains and pigments which are injurious, and even poisonous. Several persons have nearly lost their lives, from eating cheese colored with annotto, for instance. This dye is commonly adulterated with red-lead, so that the farmer (cheesemaker) may very innocently introduce a dreadful poison, when he only intends to improve the color. By making our own cheeses, the liability to such an accident is avoided.

When a whole cheese is cut, and the consumption small, it is generally found to become unpleasantly dry, and to lose flavor before it is consumed. This is best prevented by cutting a sufficient quantity for a few days' consumption from the cheese, and placing the remainder in a cool place, rather damp than dry, spreading a thin film of butter over the cut surface, and covering it with a cloth to keep off the dirt. This removes the objection existing in small families against purchasing a whole cheese at a time. The common practice of buying small quantities of cheese should be avoided, as not only a higher price is paid for any given quality, but there is little likelihood of obtaining exactly the same flavor twice running. Should cheese become too dry to be agreeable, it may be used for stewing, or when grated cheese is wanted.

Toasted cheese is much relished by some persons, but is seldom met with well prepared. The following has been handed to the writer by the cook of a certain nobleman who prides himself on his gustful appetite. Cut the cheese into slices of moderate thickness, and put them into a tinned copper saucepan, with a little butter and cream, simmer very gently until quite dissolved, then remove it from the fire, allow it to cool a little, and add some yelk of egg, well beaten; make it into a shape, and brown it before the fire.

CHELTENHAM SALTS. *Prep.* Glauber salts 1 oz.; Epsom salts ¾ oz.; culinary salt a teaspoonful; sulphate of iron 2 grs.; reduce them separately to fine powder, then mix them.

II. Glauber salts and Epsom salts, of each 28 lbs.; common salt 7 lbs.; sulphate of iron 1¼ oz.; mix.

Remarks. The above salts must be dried in an oven, or over the fire, before reducing them to powder. The Glauber's should be dried by itself, as it liquefies when slightly heated. Cathartic and tonic. *Dose.* ½ oz. to 1½ oz.

CHELSEA PENSIONER. *Prep.* Gum guaiacum ¾ oz.; rhubarb ½ oz.; cream of tartar 2 oz.; flowers of sulphur 4 oz.; nutmegs 2 in number, (all in powder;) honey 1½ lb.; make them into a confection by beating them together in a mortar.

Remarks. The dose is two tablespoonfuls, night and morning, in rheumatism. The name is said to have been given to it from the circumstance of a Chelsea pensioner having cured Lord Amherst with it.

CHILBLAIN. An inflammatory swelling, of a purple or lead color, produced by the action of cold. Children, especially those of a scrofulous habit, and elderly persons, are generally most liable to chilblains. The common cause of chilblains is holding the hands or feet to the fire, after exposure to cold. The sudden change of temperature partially destroys the vitality, and prevents the proper flow of blood through the part. The best preventives of chilblains are woollen socks or stockings, good waterproof shoes, woollen gloves, exercise, and friction. *When chilblains have once formed*, the best treatment is friction, with stimulants, as spirits of wine and camphor, turpentine, opodeldoc, dilute spirits, camphorated oil, &c. Linnæus recommends bathing the part with dilute muriatic acid, just strong enough to faintly prick the skin. When the inflamed parts have ulcerated, they are commonly called *kibes.* In this state they should be dressed with a little resin cerate, or elemi ointment, and if fungous granulations appear, they must be removed by touching them with nitrate of silver or blue vitriol.

CHILBLAINS, LOTIONS FOR, (POPULAR.) I. Dissolve white copperas 1 oz. in water 1 pint, and occasionally apply it to the affected parts.

II. Dissolve sal ammoniac 1 oz. in vinegar ½ pint; as above.

III. Mix compound soap liniment 2 oz. with tincture of Spanish flies 1 oz.; as above.

IV. Vinegar and spirit of wine, (or rum,) of each ½ pint; sal ammoniac, in powder, 1 oz.; mix and shake until the latter dissolves.

V. Spirits of salts 1 oz.; water ½ pint; mix; as above.

CHILBLAINS, OINTMENT FOR. *Prep.* Ointment of nitrate of mercury 1 oz.; camphor 1 dr.; oil of turpentine 2 drs.; oil of olives 4 drs.; mix well together. To be applied, by gentle friction, 2 or 3 times daily.

II. Calomel and camphor, of each 1 dr.; spermaceti ointment 4 drs.; oil of turpentine 2 drs.; as last.

Remarks. All the preceding lotions and ointments are intended for chilblains before they break.

CHILBLAINS, RUSSIAN REMEDY FOR. A common remedy for chilblains among the peasants in Russia is the rind of perfectly ripe cucumbers, dried with the soft parts attached, and placed with the inner side, previously soaked in warm water, over the sore parts. Dumitriefsky confirms the efficacy of this remedy. (Med. Zeitung.)

CHIMNEYS ON FIRE may be readily extinguished in several ways, without having recourse to throwing water down them from the top, by which much damage is frequently done to the furniture in the rooms. One of the simplest methods is, to scatter a handful of flowers of sulphur over the dullest part of the burning coals, the mephitic vapors arising from which will not support combustion, and consequently extinguish the flames. *Another* method is, to shut the doors and windows, and to stop up the bottom of the chimney with a piece of wet carpet or blanket, throwing a little water or flowers of sulphur, or salt, on the fire immediately before doing so. By this means the draught is stopped, and the burning soot must be extinguished for want of air. If the chimney be stopped at top, instead of the bottom, the whole of the smoke must, of course, be driven into the apartment. If every fireplace were provided with a damper, or shutter of sheet-iron or tin plate, sufficiently large to choke it thoroughly, fires in chimneys would become of little consequence, as it would only be necessary to apply this damper to put them out.

CHINA, (CHOICE OF.) In purchasing china, glass, and earthenware, care should be taken to select those sets that in case of breakage can be readily matched. Peculiar or rare patterns should be avoided, for if any such be broken, it will generally be found very difficult and expensive, and frequently impossible, to replace them.

Cleaning. China (when very dirty) is best cleaned with finely-powdered fuller's earth and warm water, afterwards rinsing it well in clean water. A little clean soft soap may be added to the water instead of fuller's earth. The same plan is recommended for cleaning glass.

Packing. As there is considerable art in packing brittle hollow-ware, in such a way that it will stand exposure to the jolting, blows, and agitation of land-carriage, it is better, where it is of much value, or in quantity, to have it done by a person used to the job. A man, accustomed to packing such articles, may be readily procured at any glass-works, or china warehouse, for a trifling consideration.

CHINA-ROOT STARCH. A reddish-colored farina, procured from the smilax china.

CHINESE SHEET-LEAD. The Chinese employ large quantities of sheet-lead in packing their tea, which they make in the following way:—Melted lead is poured from a crucible upon a large flat stone, placed upon the ground, and immediately another stone is dashed upon the fluid lead, which is thus pressed out into a very thin plate or leaf. This is instantly removed, and the operation repeated as rapidly as possible. The rough edges of the plates are afterwards cut off, and then soldered together for use. The Chinese employ two men in this process; one to pour on the melted lead, and the other to work the stone. A similar method has been adopted for some years in England, to form the plates of zinc for galvanic batteries.

CHIRAYITINE, SULPHATE OF. The substance sold under this name is sulphate of quina. Chirayita yields no alkaloid, but merely a bitter matter.

CHLORAL. A substance prepared by the action of chlorine on alcohol.

Prep. Place anhydrous alcohol in a tubulated retort, and pass dry chlorine gas through it, at first in the cold, but afterwards with the application of a gentle heat. As soon as the chlorine passes undecomposed through the liquor at the boiling temperature, the process is complete. On cooling, the liquid in the retort solidifies, forming a crystalline mass of hydrated chloral. This must be melted by gentle heat, and agitated with thrice its volume of oil of vitriol, when, on increasing the heat a little, an oily stratum of impure chloral will rise to the surface. This must be removed, boiled for some time, to drive off some free hydrochloric acid and alcohol, and next distilled with an equal volume of oil of vitriol; lastly, it must be rectified from finely-powdered quicklime, stopping the process as soon as the surface of the lime becomes dry.

Remarks. The chlorine is best introduced by a tube inserted into the tubulature of the retort, and a long tube, bent upwards, should be connected with the beak to convey away the hydrochloric acid gas extricated, and to allow the volatilized alcohol and chloral to condense and flow back into the retort.

Prop. Chloral is an oily liquid, possessing an ethereal smell; it is soluble in alcohol, ether, and water, but its solution in the latter rapidly changes into a semi-solid crystalline mass of hydrate of chloral, soluble in a larger quantity of water. Chloral boils at 202°, and has a sp. gr. of 1·502.

CHLORATE. A compound of chloric acid with a base. The chlorates are very similar to the nitrates, both in their properties and composition. They are all decomposed at a red heat, metallic chlorides being formed, and oxygen gas given off. Like the nitrates, they deflagrate with inflammable substances, but with greater facility and violence. A mixture of this kind will detonate with a slight blow or friction. All the chlorates are soluble in water.

Tests. Rubbed with sulphur, or phosphorus, they explode violently; mixed with muriatic acid, and then with water, a liquid is formed, possessing bleaching properties. When heated, they evolve oxygen. Thrown on red-hot coals, they deflagrate like nitre. Sulphuric acid turns them orange red. The following simple method of testing the commercial chlorates has been proposed by M. Choron:

place supplied by hard suet or stearine, and frequently rosin. Lard is also very generally substituted for olive oil. The operation of melting the ingredients should be performed in a water or steam bath, and the liquid mass should be assiduously stirred until cold.

CERATE, BLISTERING. *Syn.* CERATE OF SPANISH FLIES. CERATUM CANTHARIDES. (P. L.) *Prep.* Spanish flies in fine powder ℥j; spermaceti cerate ℥vj; soften the cerate by heat, then carefully mix in the powdered flies.

Use. To keep blisters open, and as a mild stimulant. Its use is sometimes, however, attended by strangury and other disagreeable symptoms. A blister on the scalp, dressed for 4 days with this cerate, was followed by the head swelling to an alarming size, an œdematose erysipelas over the face and scalp to the occlusion of the eyes, and great fever. These symptoms were removed by the use of emollient fermentations and simple dressings. (A. T. Thompson.) Very probably the cerate contained euphorbium, which it derived from the powdered flies being adulterated with this substance. (See CANTHARIDES.)

CERATE, CALAMINE. *Syn.* CERATUM EPULOTICUM, (P. L. 1745.) CERATUM LAPIS CALAMINARIS, (P. L. 1788.) CERATUM CALAMINÆ, (P. L. 1836.) HEALING SALVE. TURNER'S CERATE. *Prep.* Prepared calamine (lapis calaminaris) and wax, of each lb. ss; olive oil f℥xvj. *Proc.* Mix the oil with the melted wax, and as soon as it begins to thicken, add the calamine and stir until cold.

Use. To dress excoriations, ulcers, burns, sore nipples, &c. It is drying and healing.

Remarks. On the large scale this cerate is usually made without a particle of wax. 4 lbs. of suet are melted with 3 lbs. of lard, and 3½ lbs. of calamine sifted in: the whole is then well mixed up for a few minutes, and after one minute's repose, it is poured off into another vessel, a little coarse sediment that has fallen to the bottom being left behind. It is then stirred until cold. In many cases nothing but lard and calamine are used.

CERATE, CALAMINE, (WITH MERCURY.) *Prep.* (CERATUM CALAMINÆ CUM HYDRARGYRO, P. C.) Calamine cerate lb. j; nitric oxide of mercury ℥j. *Proc.* Triturate the oxide until reduced to an impalpable powder, then add the cerate and thoroughly blend them together.

CERATE, CALOMEL. *Prep.* Simple cerate ʒvij; calomel ʒj; mix.

CERATE, CALOMEL, (COMPOUND.) Calamine cerate ℥ij; calomel ℥j; mix.

CERATE, CINCHONA. (Paris Codex.) Equal parts of extract of cinchona and simple cerate, mixed together.

CERATE, COMPOUND LEAD. *Syn.* GOULARD'S CERATE. CERATUM PLUMBI COMPOSITUM, (P. L.) *Prep.* Solution of diacetate of lead f℥iij; wax ℥iv; olive oil ½ pint; camphor ʒss. *Proc* Add 8 oz of the oil to the melted wax, and as soon as it begins to cool, add the solution of lead, and continue the stirring until cold; then add the camphor dissolved in the remaining portion of the oil.

Use A cooling cerate for burns, excoriations, &c

CERATE COMPOUND MERCURIAL. *Syn.* CERATUM HYDRARGYRI COMPOSITUM, (P. L.) *Prep.* Mercurial ointment and soap cerate, of each ℥iv; powdered camphor ℥j; mix.

Use. As a stimulant application to indolent tumors, and as a resolvent in enlarged joints, &c.

CERATE, COPPER. *Syn.* CERATUM CUPRI. *Prep.* Liquor of ammoniated copper 1 part; simple cerate 8 parts. *Proc.* Soften the cerate by heat, then add the cupreous solution, and stir until cold. (Swediaur.)

CERATE, COSMETIC. *Syn.* POMMADE EN CREME. *Prep.* Oil of almonds 5 oz.; white wax and spermaceti, of each ½ oz.; melt, add rose water 3 oz., and tincture of balsam of Mecca ½ oz.; stir until cold.

CERATE, HEMLOCK. (CERATUM CONII, St. B. H.) Hemlock ointment 12 oz.; spermaceti 2 oz.; white wax 3 oz.; melt the last two, then add them to the first, softened by a gentle heat. Used for inveterate cancerous, scrofulous, and other sores.

CERATE, HONEY (CERATUM MELLIS, P. C.) Lead plaster and beeswax, of each 4 oz.; olive oil 6 oz.; melt and add honey 5 oz.

CERATE, KIRKLAND'S NEUTRAL. *Prep.* Lead plaster ℥viij; olive oil and prepared chalk, of each ℥iv; mix with heat and add sugar of lead ʒiij, dissolved in distilled vinegar f℥iv. Stir until cold. *Use.* As a cooling dressing for indolent ulcers.

CERATE, MARSHALL'S. *Prep.* Palm oil and calomel, of each 2 oz.; sugar of lead 1 oz.; ointment of nitrate of mercury 4 oz.; mix thoroughly by rubbing them together in a Wedgewood mortar.

CERATE, MERCURIAL. (CERATUM MERCURIALE, P. L. 1746.) Strong mercurial ointment and yellow wax, of each 6 oz.; lard 3 oz. Melt the wax and lard together, then stir in the ointment.

CERATE OF ACETATE OF LEAD. (CERATUM PLUMBI ACETATIS, P. L.) Acetate of lead in fine powder ʒij; wax ℥ij; olive oil f℥viij; melt the wax in 7 oz. of the oil; then add the acetate of lead, separately rubbed down with the remaining oil; stir until cold.

Use. As a cooling cerate to burns, excoriations and inflamed sores.

CERATE OF ARSENIC. (CERATUM ARSENICI, P. U. S.) White arsenic in fine powder ℈j; simple cerate ℥j; mix.

CERATE OF NITRATE OF MERCURY. (CERATUM HYDRARGYRI NITRATIS, St. B. H.) *Prep.* Ointment of nitrate of mercury and simple cerate, equal parts; mix.

CERATE, OPIUM. (CERATUM OPII, DR. LAGNEAU.) *Prep.* Opium in fine powder ʒss; yelk of 1 egg; mix, then rub it up with simple cerate ℥ij.

CERATE, QUININE. (CERATUM QUINIÆ, F. H.) Sulphate of quinine 1 part; simple cerate 10 parts; mix well.

CERATE, RESIN. *Syn.* YELLOW BASILICON. BASILICON CERATE. CERATUM CITRINUM, (P. L. 1745.) C. RESINÆ FLAVÆ, (P. L. 1788.) CERATUM RESINÆ, (P. L. 1809, 1824, and 1836.) *Prep.* Yellow resin and wax, of each lb. j; melt; then add olive oil f℥xvj. Stir until cold.

Remarks. This cerate is a mild stimulant, de-

tergent, and digestive application; and is employed to dress foul and indolent ulcers.

The above is the form of the Lond. Ph., but the basilicon of the shops is seldom, if ever, made in this manner. The following forms are those commonly used on the large scale, but the product is inferior to the P. L.

II. Yellow resin 10 lbs.; beeswax 2 lbs.; linseed oil 7 lbs.; melt together and stir until cold.

III. As last, but use nut oil for linseed oil.

IV. Nut oil 1 gall.; beeswax 5 lbs.; yellow resin 14 lbs.

V. Lard (common) and linseed oil, of each 3 lbs.; yellow resin 9 lbs.; mix as before.

CERATE, ROSE. *Syn.* Lip Salve. (Ceratum Rosatum, P. Cod.) Oil of almonds 1 lb.; white wax ½ lb.; alkanet root 1 oz.; melt and digest until sufficiently colored, strain, and when cooled a little, add otto of roses (24 drops) to perfume.

CERATE, SAVINE. (Ceratum Sabinæ, P. L.) *Prep.* Lard lbs. ij; savine leaves lb. j; wax ℥viij. *Proc.* Melt the wax and lard, and boil the leaves in the mixture, then strain through a linen cloth.

Remarks. The preparation of this cerate requires caution, as the active principle of the savine being volatile, is injured by long boiling or too high a temperature. The leaves are usually boiled until they are crisp, but as this takes some time, the essential oil, and consequently the odor, is nearly all dissipated. A better plan is to express the juice from the leaves, and to add it to the wax and oil melted together, and just beginning to cool. As usually met with, this ointment has a deep green color, and the odor of the fresh plant, but neither of these is derived from the leaves, in the common process of making it. The first is caused by the addition of verdigris, and the latter by adding a little of the essential oil of savine to the compound when nearly cold. The cerate prepared according to the form of either of the British Colleges, has but a very pale green color, and that rapidly changes unless it be well covered up from the air. A greater quantity of color is got from the leaves by long digestion in the fat and wax in earthen vessels, at a moderate heat, than by hastily boiling. In this way a lively green is sometimes produced, but it rapidly changes.

The following forms are those that have been adopted by many druggists for the manufacture of this cerate.

II. Lard and suet, of each 6 lbs.; yellow wax 2 lbs.; melt them together in an earthen vessel; then add 2 oz. of distilled verdigris, previously rubbed down smooth in a mortar, with an equal weight of sweet oil; strain while hot into a large earthen pot, and when cooled a little, add 1 oz. of oil of savine; stir till cold.

III. Savine leaves 4 lbs.; yellow wax 2 lbs.; lard 8 lbs.; boil until the leaves become crisp; then strain, and add, of lively-colored green ointment 5 lbs.; and when cooled a little, 3 drs. of oil of savine. Stir briskly until cold. *Prod.* 13½ lbs.

The practice of coloring this cerate with verdigris, which is next to universal, cannot be too severely censured, as its therapeutic action is thereby altered. The copper may be detected by burning down a little in a platinum or Hessian crucible, washing out the ashes with a little dilute acid, placing the liquor in a glass tube, and pouring thereon liquid ammonia. When a blue color, ammoniureted copper will be produced, if copper be present.

Use. To keep blisters open.

CERATE, SOAP. (Ceratum Saponis, P. L.) *Prep.* Boil litharge ℥xv in distilled vinegar 1 gallon until dissolved, stirring continually; then add of Castile soap ℥x; boil again until the moisture be entirely evaporated: then add gradually, wax ℥xiiss, and olive oil 1 pint, previously melted together.

Remarks. Unless the above instructions be exactly followed in every particular, the process will miscarry. When this is the case, it will be found that the cerate on cooling will separate into two portions, and be full of hard gritty particles. To prevent this, care should be taken to use soap of the best quality. When once this mishap occurs, no boiling or stirring in the world will remove it. The only remedy is the addition of a little more soap, previously melted with some water, and again evaporating to a proper consistence. A small quantity of liquor of potassa will also have the same effect.

The color and consistence of this cerate wholly depend upon the length of time it is kept heated after the addition of the oil and wax. As evaporation proceeds, so do the color and consistence increase. Its usual color is that of a lively pale chocolate-brown, but occasionally it is much paler. This arises from its containing moisture, which, by stirring, reduces the color. The following form may be used on the large scale.

II. Distilled vinegar 6 galls.; litharge 5 lbs.; soap 3½ lbs.; yellow wax 4½ lbs.; olive oil 6 pints. Mix as above. (Good nut or poppy oil may be used for olive oil.)

Uses. Soap cerate is used as a cool dressing for scrofulous swellings, &c. It may be spread on linen and applied like a plaster.

CERATE, SIMPLE. *Syn.* Oil and Beeswax. Simple Dressing. Cérat simple, (*Fr.*) Ceratum simplex, (P. L. 1824.) Ceratum, (P. L. 1809 and 1836.) *Prep.* Olive oil f℥iv; yellow wax ℥iv; mix by heat, and stir until cold.

Remarks. This is the ceratum of the "London Pharmacopœia." It is used as a simple emollient dressing for excoriations and sores. The ceratum simplex of the Scotch College is spermaceti cerate. Simple cerate is but little used, preference being given to the next preparation.

CERATE, SPERMACETI. *Syn.* White Lip Salve. Cerat de blanc de Baleine, (*Fr.*) Simple Cerate, (P. E.) Ceratum album, (P. L. 1745.) C. Spermatis Ceti, (P. L. 1788.) Ceratum Cetacei, (P. L. 1809, 1824, 1836.) *Prep.* Spermaceti ℥ij; white wax ℥viii; olive oil 1 pint. Melt together and stir assiduously until cold. *Use.* As a soft cooling dressing.

Remarks. As soon as the materials are melted, they should be moved from the fire, strained into a clean vessel, and stirred until cold. To facilitate the cooling, the vessel may be placed in cold water or a current of cold air. This will render the product both whiter and finer than when allowed to cool by itself. The operation of melting should be performed in a water bath. On the large scale

perchloride of carbon formed. *Props.* Solid; smells somewhat like camphor; it is twice as heavy as water, fusible, volatile; soluble in alcohol, ether, and oils, and slightly so in water; combustible.

II. (*Protochloride.*) When the perchloride of carbon is passed through a glass or porcelain tube filled with fragments of glass or rock crystal heated to redness, chlorine is separated, and a vapor formed, which must be condensed by the application of cold. This is the protochloride of carbon. *Prop.* Liquid, limpid, and colorless; vaporizes at 165° F.

CHLORINE. *Syn.* Oxymuriatic Acid. An elementary substance discovered by Scheele in 1774, and named by him dephlogisticated marine acid. It was afterwards called by the French chemists *oxygenized* and *oxymuriatic* acid, on the supposition of its being a compound of muriatic acid and oxygen. In 1809, Gay Lussac and Thernard suggested that it might be regarded as a simple substance; but it was reserved for Sir H. Davy to prove the truth of this suggestion. After some researches, in which every method of decomposing it was tried that genius and experience could suggest, he declared it to be a simple body, and gave it its present name, (from χλωρὸς, *green*,) on account of its color.

Prep. I. Mix together in a glass flask or retort strong muriatic acid with half of its weight of finely-powdered peroxide of manganese. Chlorine gas is immediately evolved even in the cold, but much more rapidly on the application of a gentle heat. *Remarks.* This gas must be collected in clean dry bottles by displacement. The tube conducting the gas must reach to the bottom of the bottle, when the chlorine, being heavier than the air, will displace the latter, without mixing with it. The bottle is known to be full by the gas overflowing the mouth, which is easily perceived by its green color. The bottle must now be closed up with an accurately-fitting stopper, previously greased, and an empty one put in its place, which must be subsequently treated in like manner. To free the gas entirely from muriatic acid, it may be passed through water; and to render it dry, it may be passed over dry chloride of calcium. Chlorine gas may also be collected over a saturated solution of common salt in the pneumatic trough.

II. Pour common muriatic acid, diluted with an equal weight of water, upon half its weight of chloride of lime, and proceed as before.

III. Pour sulphuric acid, diluted with water upon a mixture of common salt and binoxide of manganese previously placed in a retort. The proportions ordered by different authorities vary; the following are the principal:

Brand	4 water	5 acid .	3 oxide	8 salt.
Liebig	2 "	2 " .	1 "	3 "
Thernard . . .	4 "	4 " .	2 "	3 "
Graham . . .	as much dilute acid as contains	13 of oil vitriol	6 "	8 "

Remarks. The first or second process is the most convenient for small experiments in the laboratory, and the latter may be adopted where peroxide of manganese cannot be procured. The third is the cheapest method, and that employed on the large scale. Mr. Julius Seybel has lately taken out a patent for improvements in the manufacture of sulphate of soda and chlorine, which are formed by one operation. This is done by decomposing common salt by sulphuric acid, in closed vessels of lead, or lined with lead, having heat applied externally; and in employing the vapor of the muriatic acid thus formed to act on manganese immersed in water, such vapor being conducted below and permitted to escape upwards through the water and manganese.

Prop. Chlorine is a gaseous substance, possessing a yellowish green color, a pungent suffocating odor, and an astringent taste. Its most remarkable properties are, its power of destroying almost all vegetable and animal colors, and the putrid odor of decomposing organic matter; hence its value as a bleaching agent, and as a disinfectant and fumigant. Water absorbs twice its volume of this gas, and acquires a yellowish color. Under a pressure of about four atmospheres it condenses into a yellow transparent liquid. With the bases, chlorine forms an important series of compounds, called chlorides, chlorurets, or muriates, of which calomel and common salt may be taken as examples, the first being a chloride of mercury, and the second of sodium. The metallic chlorides are mostly solid at common temperatures, and all, save two, (mercury and silver,) soluble in water. They are fusible, and often crystalline. The chlorides of tin, antimony, arsenic, and mercury, are volatile and sublime unchanged. The chlorides are generally colorless, and resemble the salts in appearance. They are mostly decomposed by a strong heat. They are not decomposed by pure anhydrous sulphuric acid, but readily so by oil of vitriol. The metallic chlorides may generally be formed by the direct action of chlorine on the metals at common temperatures, and in many instances the union is accompanied by the evolution of light and heat. They may also be frequently formed by dissolving the oxides, carbonates, or hydrates of the bases, in muriatic acid, and crystallizing, or applying heat, until all the water is expelled. Chlorine has such a strong attraction for the metals that it displaces oxygen in nearly all cases at a red heat.

Tests. This gas is readily distinguished from other gases by its color, odor, and bleaching properties. It forms a white curdy precipitate with nitrate of silver, (chloride of silver,) which is insoluble in nitric acid, but readily so in liquid ammonia, and is blackened by light. Its aqueous solution dissolves gold leaf, and instantly blackens a piece of silver plunged into it. It rapidly destroys the color of iodide of starch, solution of indigo, litmus, and turmeric. The soluble chlorides may be readily detected by acidulating their solutions with nitric acid, and then adding a solution of nitrate of silver, when chloride of silver will be precipitated, and may be recognised in the way just mentioned. The insoluble chlorides may be tested by digesting them in a little liquor of potassa, when a solution of chloride of potassium will be formed, which may be treated as a liquid chloride; or the chloride may be dissolved in nitric acid, and tested with nitrate of silver as before. A simple method of detecting free chlorine is to hold a rod, dipped in

water of ammonia, over it, when white fumes of sal ammoniac will be formed; this, coupled with the property of bleaching colors, may, in most cases, be taken as evidence of the presence of this substance. (See CHLOROMETRY.)

Ant. When the fumes of chlorine are inhaled, it proves an irritative poison. The best antidotes are said to be ammoniacal gas or the vapors of warm water, of wine, or of ether. The writer of this article once suffered severely from getting a full inspiration of this gas, by the bursting of a large vessel employed in its manufacture, and which was full at the time. For a minute or two he was completely overcome; but, on being removed into the fresh air, he rapidly recovered, and, with the exception of a *violent* and *convulsive* cough, which lasted several hours, felt even better than he did before. The gas appeared to have acted both as a mental and bodily stimulant. Every known antidote was tried in this case, but without any apparent advantage. The effects gradually wore off, after the lapse of seven or eight hours.

CHLORINE, LIQUID. *Syn.* OXYMURIATIC ACID OXYMURIATIC WATER. SOLUTION OF CHLORINE. CHLORINE WATER. DEPHLOGISTICATED SPIRIT OF SALT. *Prep.* I. (*Aqua Chlorinii*, P. D.) Mix 87 parts of sulphuric acid with 124 of water, and pour it upon 100 parts of dried muriate of soda and 30 parts of oxide of manganese, previously mixed together and placed in a retort. Conduct the gas evolved into 200 parts of distilled water.

II. (*Aqua Chlorinei*, P. E.) Muriate of soda 60 grs.; red oxide of lead 350 grs.; triturate together, and put them into f℥ viij of distilled water contained in a stoppered bottle; then add 2 fluid drachms of sulphuric acid, put in the stopper, and agitate occasionally until the oxide of lead turns white. The clear liquid (after subsidence) is to be poured off into another stoppered bottle.

III. Pass chlorine gas, procured by any of the methods mentioned under Chlorine, into water, until it will absorb no more.

CHLORITES. Salts formed of the chlorous acid with the bases. The alkaline chlorites may be formed by passing a current of chlorous acid gas into a solution of the pure alkalis. They are soluble and remarkable for their bleaching and oxidizing properties.

CHLORITES, (HYPO-.) These are formed by the action of chlorine gas on the salifiable bases. Chloride of lime, soda, and potash are said by some to be hypochlorites, but this is undecided; in fact, the very existence of the hypochlorites has been denied.

CHLORO-CARBONIC ACID. *Syn.* PHOSGENE. CHLORO-CARBONOUS ACID. *Prep.* Expose equal volumes of carbonic oxide and dry chlorine to the rays of the sun, or diffused daylight. In the first case combination ensues in a few minutes, in the second after a few hours. *Prep.* A colorless gas, having a disagreeable odor; easily decomposed, especially by water.

CHLOROMETER. *Syn.* CHLORIMETER. An instrument for testing the strength of chlorides.

CHLOROMETRY. *Syn.* CHLORIMETRY. CHLOROMETRIE, (*Fr.*) The process or operation of testing the decoloring power of the compounds of chlorine. It is principally applied to those met with in commerce,—the chlorides of lime, potash, and soda. Among the numerous tests proposed for this purpose, the following appear to be those most worthy of notice.

I. (*Dalton's test.*) Weigh exactly 78 grs. of pure proto-sulphate of iron, previously dried by strong pressure between the folds of cloth, and dissolve it in 2 oz. of distilled water, to which add a few drops of muriatic or sulphuric acid. Next weigh out exactly 50 grs. of the chloride of lime, well mix it in a mortar with 2 oz. of tepid water, and pour the mixture into a graduated tube or alkalimeter. Then fill the measure up to 0 with the washings of the mortar. The whole should be now well mixed, by placing the thumb over the orifice and shaking it. The solution of chloride of lime is next to be gradually and cautiously added to the solution of sulphate of iron, until the latter be completely peroxidized, which may be known when it ceases to be affected by the red prussiate of potash. The latter test is applied by putting a drop of its solution upon a white plate, and touching it with the point of a glass stirrer or rod, dipped in the liquor under examination. As soon as the test indicates that enough of the solution of the chloride has been added, the number of measures poured from the alkalimeter must be carefully observed, from whence the richness of the sample may be estimated, as follows:—As 100 of the alkalimeter divisions contain exactly 50 grs. of the chloride, each measure will contain half a grain, and, consequently, any number of measures consumed, will represent half that number of grains of the chloride under examination; and the weight of the chloride thus used will have contained 10 grs. of chlorine—the constant quantity of that substance required to peroxide the given solution of sulphate of iron. Thus;—If 80 measures of the liquor in the alkalimeter be consumed, this quantity will have contained 40 grs. of the chloride and 10 grains of chlorine. By dividing 1000 by this number, the per centage of chlorine will be obtained, thus:

$$\frac{1000}{40}=25\%.$$

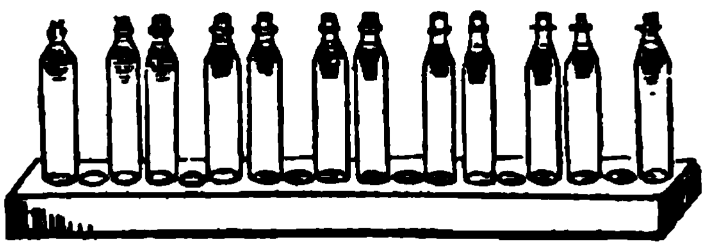
The above method admits of much greater accuracy, if the chloride of lime be dissolved in tepid water, placed in a Schuster's alkalimeter, previously weighed, and the solution made up to exactly 1000 grs. when cold. The quantity consumed may here be ascertained with great exactness. Every grain of the solution will be only equal to $\frac{1}{20}$ of a grain of the chloride. The quantity of the solution consumed is determined by weighing the alkalimeter before and after the operation. The difference is the quantity that has been used.

A modification of this plan has been suggested by Mr. Crum. He proposes to make the solution of the sulphate of iron in a stoppered bottle, and to add the chloride in the state of powder from a weighed quantity.

II. (*Crum's process.*) Mix equal weights of water and muriatic acid, and dissolve therein cast-iron borings until saturated. To ensure perfect saturation a large excess of iron is employed, and the liquid kept at the heat of boiling water for some time. One measure of the solution, marking 40° on Twaddle's scale, (sp. gr. 1·200,) is mixed with an equal quantity of acetic acid, (sp. gr. 1·048.)

This forms the proof solution, which, if mixed with 6 or 8 parts of water, is quite colorless, but chloride of lime occasions the production of peracetate of iron, which gives it a red color.

The above proof-solution is then poured into 12 two-oz. vials, of exactly equal diameters, to the amount of $\frac{1}{6}$ of their capacity; these are filled up with bleaching liquid of various strengths; the first at $\frac{1}{12}$ of a degree of Twaddle, the second $\frac{2}{12}$, and so on up to $\frac{12}{12}$ or 1°. They are then well corked up, and, after agitation, arranged side by side on a tray, furnished with holes to receive them, in the manner represented in the engraving. A se-



ries of test vials are thus formed, showing the various shades of color that the solutions of the given strengths are capable of producing. To ascertain the strength of an unknown sample of bleaching liquor, the proof solution of iron is put into a vial, exactly similar to the 12 previously used, and in precisely the same proportion, ($\frac{1}{6}$.) The vial is then filled up with the bleaching liquor, well shaken, and placed beside that one of the 12 already prepared which it most resembles in color. The number on that vial expresses the strength of the sample under examination, in $\frac{1}{12}$ths of a degree of Twaddle's hydrometer.

TABLE exhibiting the quantity of Bleaching Liquid, at 6° on Twaddle's scale, (sp. gr. 1·030,) required to be added to a weaker liquor, to raise it to the given strengths. Adapted from Mr. Crum's table by Mr. Cooley.

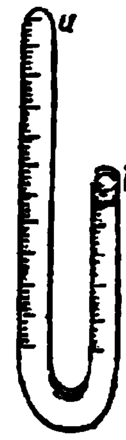
Strength of sample in $\frac{1}{12}$°.	Required Strength.	Proportions required. Given Sample.	Liquor at 6°.
		Parts.	Part.
Water.	$\frac{8}{12}$°	8	1
1	do.	9¼	1
2	do.	11	1
3	do.	13½	1
4	do.	17	1
5	do.	23	1
6	do.	35	1
7	do.	71	1
Water.	$\frac{6}{12}$°	11	1
1	do.	13½	1
2	do.	17	1
3	do.	23	1
4	do.	35	1
5	do.	71	1
Water.	$\frac{4}{12}$°	17	1
1	do.	23	1
2	do.	35	1
3	do.	71	1
Water.	$\frac{3}{12}$°	23	1
1	do.	35	1
2	do.	71	1

Remarks. The preceding method is admirably suited for weak solutions, such as are employed for bleaching textile fabrics, and is well adapted (from its simplicity) to the purposes of practical men. It is employed in many of the Scotch bleaching houses.

According to Mr. Crum, the range of strength within which cotton is safe, is very limited. A solution at 1° of Twaddle's scale, (sp. gr. 1·005,) is not more than safe, while one at ½° is scarcely sufficiently strong for the first operation on stout cloth, unless it be packed more loosely than usual. (Trans. Glasgow Phil. Soc.)

III. (*Ure's test.*) This consists in adding water of ammonia of a known strength, tinged with litmus, to a solution of a given weight of the chloride, until the whole of the chlorine be neutralized, which is known by the color ceasing to be destroyed. From the quantity of ammonia consumed, the strength is estimated. During the above process azote is evolved, and the estimation of the volume thus liberated has been proposed as another easy method of chlorimetry by Dr. Ure.

This gentleman recommends the two substances to be mixed in an inverted and graduated syphon tube over mercury. (See Engraving.) "The shut end *a* and the open end *b*, are both graduated to one scale; for example, to $\frac{1}{100}$ of an inch, or to grain or 10 grain measures. The tube is to be filled with mercury, and then 10 measures of it are to be displaced at the open end, by inserting a wooden plug. This space being filled with a solution of a given weight of chloride of lime, is to be turned up into the shut end, by covering the open end with the finger and inverting the tube; a few drops of water may be sent through to wash the mercury. The ammonia being now let up will cause a reaction, and evolve a quantity of azote, equivalent to the chlorine present. The action may be accelerated by holding the sealed end of the tube over the flame of a spirit-lamp. The mercury is protected from the chlorine by the ammonia; and should any notion be entertained of such an action, the ammonia may be let up first. I have made innumerable researches over mercury, with a detached apparatus of this kind, which combines precision with rapidity of result." (Ure's Dict. Arts.)



IV. (*Process of M. Gay Lussac.*) One part of the best indigo is dissolved in 9 parts of strong sulphuric acid, by the aid of a gentle heat. This solution is then mixed with distilled water, in such proportion, that 1 volume of chlorine gas shall exactly decolor 10 volumes of this solution. Each measure so decolored is called a degree, and each degree is divided into fifths. 5 grains of the best chloride of lime, dissolved in 500 grain measures of water, will possess the above power, and indicate 10° or proof, and will decolor 10 times its volume of the indigo solution. The objections to this method of chlorimetry are, that the indigo solution alters by keeping, and that it is not adapted for testing strong solutions of chloride of lime. "I have tried the indigo test in many ways, but never could confide in it." (Ure.)

CHLORO-NITROUS GAS. A gaseous compound, discovered by E. Davy. It is obtained

by treating fused chloride of sodium, potassium, or calcium, in powder, with as much strong nitric acid as is sufficient to wet it, when this gas is evolved. *Prop.* It has an orange color, smells like chlorine, and bleaches. Soluble in water.

CHLOROPHYLL. *Syn.* CHLOROPHILE. CHLOROPHYLE. The green coloring matter contained in the leaves, stalks, unripe fruit, and juices of most plants. It is extracted by ether, and purified by successive solutions in alcohol and muriatic acid; from the last it is precipitated pure by water.

Prop. A dark green mass, producing a grass-green powder. It is soluble in ether, alcohol, acids, alkalis, and oils. If an earthy or metallic salt be mixed with the alcoholic solution, and an alkaline carbonate be added, the earth or oxide is thrown down in combination with this coloring matter, forming a green lake, possessing considerable permanency. Pelletier and Caventou, who first discovered chlorophyll, obtained it by simply pressing the leaves, washing in water, and afterwards treating it with alcohol.

CHLOROUS ACID. *Syn.* PEROXIDE OF CHLORINE. A compound of oxygen and chlorine. *Prep.* Chlorate of potassa in fine powder, made into a paste with strong sulphuric acid, is put into a retort and heated in a water-bath, hot but not boiling. A yellowish green gas is given off, which may either be collected in dry bottles, or passed into water, when it will form liquid chlorous acid.

Props., &c. Its aqueous solution undergoes gradual decomposition, yielding chlorine and chloric acid. It possesses powerful oxidizing and bleaching properties, and unites with the bases forming salts called chlorites. These are all soluble in water, and possess bleaching powers like the acid. They may be recognised by the evolution of chlorous acid gas when acted on by an acid.

CHOCOLATE. *Syn.* CHOCOLADA. CHOCOLAT, (*Fr.*) The roasted cacao nut made into a paste by triturating it in a heated mortar, with sugar and aromatics, and cast in tin moulds, in which it concretes into cakes on cooling. The term is derived from two Indian words, *choco*, sound, and *atte*, water; because of the noise made in its preparation. (Dr. Alston.)

Qual. Chocolate is nutritive and wholesome, if taken in moderation, but is sometimes apt to disagree with weak stomachs, especially those that are easily affected by oily substances or vegetable food. The quantity of aromatics mixed with the richer varieties, improve the flavor, but render them more stimulant and prone to produce nervous symptoms, and complaints of the head.

Prep. The nuts are first roasted, (on the small scale this may be done in a frying-pan,) and after being cleared from the husks, reduced to coarse powder; they are then beaten in an iron mortar, the bottom of which is heated, until they are reduced to a paste, which is effected by the action of the heat on the oil or butter they contain. This paste or semi-fluid mass is then poured out into moulds, and left until cold, when it forms *cake chocolate*, or *chocolate paste;* or it may be reduced to coarse powder, by grinding, when it is known under the name of *chocolate powder*.

Remarks. Chocolate, prepared as above, without the addition of aromatics, is known in the trade as *plain chocolate*. The Spaniards flavor it with vanilla, cloves, and cinnamon, and frequently scent it with musk and ambergris. In general, they add too large a quantity of the last four articles. The Parisians, on the contrary, use but little flavoring, and that principally vanilla. They employ the best caracca nuts, and add a considerable quantity of refined sugar.

The mass of the common chocolate sold in England, is prepared from the cake left after the expression of the oil, and this is frequently mixed with the roasted seeds of ground peas, and maize or potato flour, to which a sufficient quantity of inferior brown sugar, or treacle and mutton suet is added, to make it adhere together. In this way is made the article commonly marked in the shops at 8*d*., 9*d*., and 10*d*. the pound. I know a person who lately bought a large quantity at 5*d*., whereas good nuts, in their unprepared state, cost at wholesale more than double the money.

To excel in the manufacture of chocolate requires some little experience. The roasting of the nuts must be done with great care, and the process stopped as soon as the aroma is well developed. They should then be turned out, cooled, and fanned from the husks. On the large scale, chocolate is made in mills, worked by steam power, and the machinery employed in the grinding, admirably fulfils its duty.

The South American beans are esteemed the best for making chocolate. Like wine, it improves by age, if kept in a dry but not too warm a place.

CHOCOLATE CREAM. *Prep.* Chocolate scraped fine 1 oz.; thick cream 1 quart; sugar (best) 6 oz.; heat it nearly to boiling, then remove it from the fire, and mill it well. When cold, add the whites of 8 or 10 eggs; whisk rapidly, and take up the froth on a sieve; serve the cream in glasses, and pile up the froth on the top of them.

CHOCOLATE DROPS. Reduce 1 oz. of chocolate to fine powder by scraping, and add it to 1 lb. of finely-powdered sugar; moisten the paste with clear water, and heat it over the fire until it runs smooth, and will not spread too much when dropped out; then drop it regularly on a smooth plate. Avoid heating it a second time.

CHOCOLATE FOR ICING. *Syn.* SORBET AU CHOCOLAT. *Prep.* Rub 2 oz. of chocolate to a paste with 2 tablespoonfuls of hot milk, then add cream for icing 1 quart. Ice as wanted for use.

CHOCOLATE FOR THE TABLE. *Prep.* Put the milk and water on to boil; then scrape the chocolate fine, from one to two squares to a pint, to suit the stomach: when the milk and water boils, take it off the fire, throw in the chocolate, mill it well, and serve it up with the froth, which process will not take five minutes. The sugar may either be put in with the scraped chocolate, or added afterwards.

It should never be made before it is wanted; because heating again injures the flavor, destroys the froth, and separates the body of the chocolate; the oil of the nut being observed, after a few minutes' boiling, or even standing long by the fire, to rise to the top, which is the only cause why chocolate can offend the most delicate stomach.

CHOCOLATE, FRENCH. *Prep.* Finest ca-

cao nuts 3 lbs.; best refined sugar 1 lb.; beans of vanilla 2 in number; grind together, as before described.

CHOCOLATE MILK. *Prep.* Dissolve 1 oz. of chocolate in 1 pint of new milk

CHOCOLATE POWDER. Cake chocolate scraped or ground. Usually sold in tin canisters.

CHOCOLATE, SPANISH. *Prep.* I. Caracca nuts 11 lbs.; sugar (white) 3 lbs.; vanilla 1 oz.; cinnamon (cassia) ¼ oz.; cloves ½ dr.; as above.

II. Caracca nuts 10 lbs.; sweet almonds 1 lb.; sugar 3 lbs.; vanilla 3 oz.; as above.

III. Caracca nuts 8 lbs.; island cacao 2 lbs.; white sugar 10 lbs.; aromatics as above.

IV. Island cacao 7 lbs.; farina to absorb the oil; inferior.

CHOCOLATE, VANILLA. *Syn.* Chocolat a la Vanilla. Caracca nuts 7 lbs.; Mexican vanilla 1 oz.; cinnamon ½ oz.; cloves 3 in number; as before.

II. Best chocolate paste 21 lbs.; vanilla 4 oz.; cinnamon 2 oz.; cloves ½ dr.; musk 10 grs.; as before.

CHOLERA. *Syn.* Cholera Morbus. English Cholera. (From χολη, *bile*, ρέω, *I flow*. Celsus.) A disease characterized by bilious vomiting and purging, accompanied by great pain and debility. It most frequently occurs towards the end of the summer and the beginning of autumn, and appears to be produced by sudden changes of temperature, checked perspiration, and the excessive use of indigestible fruit, &c. It is usually accompanied by fever, thirst, and severe abdominal pains, and *sometimes* by cold sweats, extreme debility, feeble pulse, &c., under which the patient sinks in 24 hours.

Treat. In most cases this complaint is not dangerous, and yields to proper treatment in a few days. As soon after the commencement of the attack as possible, some mild aperient, as castor oil, should be administered, and its action accelerated by drinking copiously of diluents, as barley-water, toast and water, water gruel, &c. Opiates may be employed, both topically and by the mouth. A teaspoonful of laudanum rubbed over the region of the stomach and bowels, is a simple method, and will generally allay the pain. 15 or 20 drops of laudanum, mixed with a tablespoonful of good brandy, may also be taken every hour, if the pain be severe. Should the stomach reject it, or the vomiting be apparently increased by drinking copiously, the same treatment should be persevered in. When the violence of the symptoms has abated, tonics and bitters, as gentian, calomba, orange-peel, &c., may be had recourse to.

CHROMATE. A saline compound, formed by the union of the chromic acid with a base. The chromates are characterized by their yellow or red color, the latter predominating when the acid is in excess.

Prep. The insoluble salts of chromic acid, as those of baryta, zinc, lead, mercury, silver, &c., may be made by mixing a soluble salt of those bases, with neutral chromate of potassa. The first three are red, the fourth orange, and the fifth deep red or purple.

Tests. 1. On boiling a chromate in hydrochloric acid, mixed with alcohol, chromic acid is first set free, and then decomposed, forming a green solution of chloride of chromium. 2. With acetate of lead, the chromates give a yellow precipitate; 3, with nitrate of silver, a reddish violet; 4, with nitrate of mercury, a red one.

CHROMATE OF POTASH. *Syn.* Salt of Chrome. Neutral Chromate of Potassa. On the large scale this salt is prepared from chrome ore, a natural octohedral chromate of iron, found in various parts of Europe and America.

Prep. I. The ore, freed as much as possible from its gangue, is ground to powder in a mill, and mixed with ½ or ⅓ of its weight of bruised nitre, and in this state exposed to a powerful heat for several hours, on the hearth of a reverberatory furnace, during which time it is frequently stirred up with iron rods. The calcined matter is next raked out and lixiviated with water. A beautiful yellow-colored solution results, which is evaporated briskly over a naked fire, when the chromate of potash falls down under the form of a granular yellow salt, which is removed from time to time with a ladle, and thrown into a wooden vessel, furnished with a bottom full of holes, called the draining box, where it is left to drain and dry. In this state it forms the commercial chromate of potash. By a second solution and crystallization, it may be obtained in larger and more regular crystals.

Remarks. As the object to be aimed at in conducting this process, is to procure a neutral chromate of potassa, it is evident that the quantity of chrome oxide in the ore should be first ascertained, so that the proper quantity of nitre may be added. In every case, the proportion of nitre or alkali should be *slightly* less than what is absolutely required to saturate the ore, as the production of a neutral salt is thereby ensured; and should not the whole of the chrome oxide be decomposed by the first burning, it may easily be roasted a second time with fresh alkali, should the remaining quantity be thought worth saving. These remarks also apply to the following formulæ.

II. Chrome ore (containing 50% of protoxide of chrome) 2 parts; saltpetre 1 part; as last.

III. Chrome ore of 34%, 4 parts; potashes 2 parts; nitre 1 part; as above.

IV. Chrome ore of 34%, 10 parts; potashes 5 parts; peroxide of manganese 1 part; as last.

V. (*Process of Mr. Charles Watt, jun.*) "I have tried numerous experiments, with a view to the employment of cheaper salts than the nitrates in this branch of manufacture. I have found that the sulphates of potassa and soda may be entirely substituted for the nitrates of those bases, by the simultaneous employment of lime, which assists in the decomposition of the sulphate.

"The process is as follows:—The sulphate is to be ground, or otherwise intimately mixed with the pulverized ore, and the lime* is then added, which should also be intimately mixed with the mass. It is then to be subjected, for about 4 hours, to a strong red heat. The nature of the furnace to be employed for the purpose is not of any great im-

* "It is quite immaterial whether the lime be in a state of carbonate, or otherwise; but I think, generally speaking, it will be found quite as advantageous to employ that which has been burnt, as it will save trouble and expense in grinding."

portance, so long as carbonaceous matters from the fire are entirely excluded, and the required temperature is attainable. Unless strong heat is employed, no decomposition will take place; the temperature already employed in manufacturing this article from the nitrates, will be sufficient, and the furnaces used in every way suitable. The mass should be well raked about every half hour, to ensure the whole of it being sufficiently heated.

"Proceeding thus, the manufacturer may ascertain whether the process is complete by taking out a sample from the furnace, and treating it with a slight preponderance of dilute pure nitric acid, then adding chloride of barium; if, on this addition, much precipitate of sulphate is formed, the operation is not completed; but if, on the other hand, only a slight milkiness is produced, the 'batch' may be considered as finished.

"I have found, from numerous analyses, that different samples of the ore vary considerably in the quantity of oxide of chromium which they contain, and I therefore advise every manufacturer to analyze a fair average sample before he makes a purchase."

The following is the plan which Mr. Watt has adopted for this purpose:—

"Take a given weight of the ore, say 200 gr., previously reduced to a fine powder, and intimately mix it with twice its weight of the nitrate of potassa or soda,* adding a little slaked lime to prevent it from fluxing; place it in an iron crucible, and subject it to a strong red heat for about 3 or 4 hours; then treat the mass with water to dissolve out the chromate. The insoluble matter having been washed several times until the water has ceased to come off colored, the washings are to be added together and evaporated to concentrate the solution. This being done, it is to be treated with an excess of dilute sulphuric acid to liberate the chromic acid, and then treated with spirit of wine, by which the chromic acid will be reduced to the state of green oxide, which will remain in solution in the preponderance of sulphuric acid employed. A solution of caustic ammonia in excess is then to be added, which will precipitate the oxide of chromium; the mass is then boiled to evaporate the superabundance of ammonia.

"It must now be passed through a filter to collect the oxide, and a little fresh water poured on it to free it from any saline matter: then gently dry on the filter, when it may be entirely removed with ease, as the oxide, which was previously of a very bulky nature, contracts very considerably. It may then be subjected to a dull red heat in a silver, platinum, or porcelain crucible, and afterwards its weight ascertained, from which the per centage of oxide of chromium which the ore contains, and, consequently, the amount of sulphate required to convert it into a chromate, may be calculated." (Chemist, iv. 70.)

Prop., Uses, &c. The commercial chromate of potash has a bright yellow color, but in other respects, resembles coarse culinary salt. It is used in various processes in the arts,—in dyeing, bleaching, the manufacture of chromic acid, bichromate of potassa, and several other chromates.

* "It will be as well to use a nitrate in the analysis; the quantity being small, it will be of no consequence."

Pur. Chromate of potash is very commonly adulterated with sulphate and muriate of potash, it therefore becomes important to the manufacturer to be able to test its purity.

I. (*Test of M. Zuber.*) Add tartaric acid, dissolved in 50 parts of water, to a like solution of the sample. As soon as the decomposition is complete, and the color verges towards the green, the supernatant liquor should afford no precipitate with either the nitrate of silver or baryta, whence the absence of muriates and sulphates may be inferred. The proportions are, 8 parts of tartaric acid to 1 part of the chromate, both in solution. If saltpetre be the adulterating ingredient, the sample will deflagrate when thrown upon burning coals.

Mr. Watt says, "A short time ago, I was supplied with a sample which was nothing but sulphate of soda and chloride of sodium, colored with a strong solution of the chromate, and which caused a white precipitate in any of the soluble salts of lead. For the benefit of the purchaser, I subjoin the following method of examining the chromates of potassa and soda.

"First ascertain the quantity of moisture contained in the sample, by weighing out a certain portion, drying it on a sand-bath, and again weighing; the loss of weight will give the quantity of water: then dissolve it in distilled water, and add any soluble salt of lead until it ceases to give a precipitate. The mass is then to be boiled, and more distilled water added; the supernatant liquor is then to be poured off, and if the sample under examination contain any chloride of sodium, small shining crystalline needles of chloride of lead will form in the liquor as it cools. The remaining precipitate is then to be treated with strong nitric acid, which will decompose the chromate; by adding distilled water, the nitrate of lead, formed by the decomposition of the chromate of lead, will be dissolved, and the remaining sulphate of lead, if any, may be dried, and its amount ascertained, from which the quantity of sulphate in the chromate may be calculated.

"If it be required to ascertain the quantity of chloride, this may be done by redissolving the chloride of lead by means of heat, and operating on it by any of the soluble salts of silver." (Chemist, iii. 388.

CHROMATE OF POTASH, (BI- OR SUPER-.) *Prep.* Acidulate a concentrated solution of the neutral chromate with sulphuric, or, still better, the acetic acid. Then heat the liquid and allow it to cool slowly, when beautiful red crystals of bichromate of potash will be deposited. Its *Prop., Uses, and Tests* are the same as the neutral salt.

CHROMATE OF POTASH, SOLUTION OF. *Prep.* Dissolve neutral chromate of potash 1 oz., in distilled water 1 lb. *Use.* As a test liquor for metals, especially lead.

CHROMATE OF SODA. This salt may be prepared in the same way as chromate of potash, by employing a salt of soda instead of potassa in the preceding processes. It may also be made on the small scale for experiment, by neutralizing chromic acid with carbonate of soda.

Remarks. This salt has been proposed as a substitute for chromate of potassa, and has the advantage in cheapness. "Why nitrate of *potassa*

Remarks. 1 drachm of this decoction, mixed with 7 drachms of water, forms a similar preparation to the Decoctum Sarzæ of the Pharmacopœia, and is now very frequently substituted for it in dispensing. (See SARSAPARILLA.)

DECOCTION OF SARSAPARILLA, COMPOUND. *Syn.* LISBON DIET DRINK. COMPOUND DECOCTION OF SARSAPARILLA AND THE WOODS. DECOCTUM LUSITANICUM. DEC. SARSAPARILLÆ COMPOSITUM, (P. D.) DEC. SARZÆ COMP., (P. L.) *Prep.* Decoction of sarsaparilla (boiling) 4 pints; sassafras chips, guaiacum, (rasped,) liquorice root, (bruised,) of each ℥x; mezereon root ℥iij; boil for 15 minutes, and strain.

Dose, &c. 4 to 6 oz. 3 or 4 times a day, either along with or after a mercurial course, in chronic rheumatism, lepra, psoriasis, and several other skin diseases. It is alterative and diaphoretic; during its use the skin should be kept warm. See the preceding articles, and SARSAPARILLA, in its alphabetical order.

DECOCTION OF SARSAPARILLA, COMPOUND, (CONCENTRATED.) There is a very considerable trade done in this article, in consequence of the compound decoction of sarsaparilla being very commonly ordered in prescriptions, and taken in large doses. When mixed with 7 times its weight of water, it forms a similar preparation to the *Decoctum Sarzæ compositum*, P. L.; and is very generally substituted for it in dispensing. When *honestly* and *skilfully* prepared, it is really a most *convenient* and *valuable* article; it is, however, more *frequently* met with of an inferior quality, and as the difference is not readily distinguished by mere ocular examination, it would be better for the dispenser to avoid employing it, unless it be ordered. The following formula is that employed by one of the largest metropolitan drug-houses, which is proverbial for the superior quality of their decoction of sarsaparilla.

Prep. Red Jamaica sarsaparilla 96 lbs.; mezereon root 9 lbs.; liquorice root (bruised) 16 lbs. *Proc.* These are packed into a clean copper pan, and two or three boards with as many ½ cwt. iron weights placed thereon; water is now run in, to about 10 inches higher than the ingredients, and heat is applied until ebullition commences. The materials are now allowed to macerate without boiling for about 6 hours, when the weights and boards are removed, and the liquid is gently boiled for 1 hour, care being taken to add fresh water from time to time, so as to keep the whole well covered. The decoction is next run off, and set evaporating as quickly as possible; the ingredients are then washed with boiling water, by allowing it to descend from a species of shower-bath, after the manner of "sparging," described under "*Scotch ale.*" This is repeated until the water runs off nearly colorless. The whole of the liquid is now evaporated without delay, until reduced to 8¼ gallons, when, after cooling, 2 drachms of essential oil of sassafras, dissolved in 2 gallons of rectified spirit of wine, are added, and afterwards, 1 pint of essence of guaiacum. The liquid is then placed in a suitable sized barrel, set upon its head, fitted with a small cock, (*not* placed *too* near the bottom,) and allowed to repose for a week, by which time it becomes clear and brilliant.

Remarks. To conduct this process successfully, several large copper pans are required; one of which, to boil the ingredients in, must be capable of containing from 120 to 150 gallons at least, and the remainder sufficiently large to receive the liquors drawn off. The evaporation and decoction should also be conducted by steam-heat. A very excellent plan adopted by some houses is, to employ large wooden vats, and to apply the heat by means of pipes laid along the bottom, and supplied with high-pressure steam. This method is less expensive than the use of double steam pans, as above. When essence of guaiacum is not used, 24 lbs. of guaiacum shavings, from which the dust has been sifted, are boiled with the other ingredients instead. (See SARSAPARILLA.)

DECOCTION OF SENEGA ROOT. *Syn.* DEC. OF AMERICAN SNAKEROOT. DEC. SENEGÆ, (P. L.) *Prep.* Seneka root ℥x; water 2 pints; boil to one-half, and strain.

Dose. f℥iss to f℥iij, three or four times daily, in humoral asthma, chronic cough, dropsy, &c. It is stimulant, expectorant, and diuretic, and in large doses, emetic and cathartic. It is the antidote employed by the Senegaro Indians against the bite of the rattlesnake. (Dr. Tennant.)

DECOCTION OF SQUILLS, COMPOUND. *Syn.* DEC. SCILLÆ COMP. *Prep.* (P. U. S.) Squills ℥iij; juniper berries ℥iv; snakeroot ℥iij; water lb. iv; boil to one half, strain, and add of sweet spirits of nitre f℥iv.

DECOCTION OF STARCH. *Syn.* MUCILAGO AMYLI, (P. L. 1788–1824.) DEC. AMYLI, (P. L. 1836.) *Prep.* Starch ℥iv; water 1 pint; mix gradually and boil for a short time. *Use.* As an enema in dysentery, diarrhœa, and excoriations of the rectum.

DECOCTION OF STEMLESS MILK VETCH. *Syn.* DEC. ASTRAGALI. *Prep.* (P. Cod.) Root of the astragalus escapus ℥x; water 3 pints; boil to 1 quart. *Dose.* The whole to be taken within the 24 hours. Alterative, &c.

DECOCTION, STRENGTHENING. *Syn.* TONIC DECOCTION. *Prep.* I. Peruvian bark, bruised, ℥ss; Virginian snakeroot ℥ij; water 1 pint; boil to one half, strain, and add spirits of cinnamon ℥iss; diluted sulphuric acid ℥iss. *Dose.* 2 oz. two or three times a day.

II. Decoction of bark ℥v; tincture of bark ℥vj; aromatic confection ℈j; sal volatile ℥j. *Dose.* 1 or 2 tablespoonfuls night and morning.

DECOCTION OF SUET. *Syn.* ARTIFICIAL GOAT'S MILK. DEC. SEVI. *Prep.* (Dr. Cummin.) Tie some chopped mutton suet in a piece of muslin, and simmer it for a short time in milk.

DECOCTION, SYDENHAM'S WHITE. *Syn.* HARTSHORN DRINK. MISTURA CORNU USTI. *Prep.* Prepared burnt hartshorn ℥ij; gum arabic ℥j; water 3 pints; boil to 1 quart and strain. Mucilaginous; demulcent.

DECOCTION OF TAMARINDS. *Syn.* DEC. TAMARINDORUM. *Prep.* Tamarinds ℥iss; water 1 pint; boil for 5 minutes and strain. A pleasant drink in fevers, asthma, chronic coughs, &c.

DECOCTION OF TAMARINDS AND SENNA. *Syn.* DEC. TAMARINDORUM CUM SENNA, (P. E. 1744.) Tamarinds ℥vj; cream of tartar ℥ij; water f℥xxiv; boil in a glazed earthen vessel until reduced to f℥xiv; then infuse therein for 12

hour until the process be completed, which may be known by the mass assuming a yellow color, instead of the grayish one it previously possessed. Care must be taken not to employ too much heat, as the product of this process (chromate of lime) is readily decomposed, and assumes a green color, in which case it is rendered useless. From the chromate of lime the acid is procured by the action of an equivalent proportion of sulphuric acid. This process has the great recommendation of cheapness, and Mr. Watt says that he has employed it in the factory of Messrs. Haws, for nearly two years, with *perfect success.*

Prop., Uses, &c. Pure chromic acid forms red crystals, and is soluble in water and alcohol. It is readily decomposed by the action of light and contact with organic matter. Hence it should be kept in stoppered glass bottles, and its solution filtered through asbestos. The ease with which it parts with a portion of its oxygen constitutes its value as a bleaching agent. It is largely employed in the arts, in calico-printing, bleaching of textile fabrics, tallow, oils, &c.

CHROMIUM, (from χρωμα, color.) A metal discovered by Vauquelin in 1797.

Prep. I. Mix dry chloride of chromium with oil, place the paste in a crucible lined with charcoal, lute on the cover, and expose it for an hour to an intense heat. (Vauquelin.)

II. Heat the compound of terchloride of chromium and ammonia to redness, and expose it to a current of dry ammoniacal gas. (Liebig.)

Remarks. The product of the first process has a whitish-yellow color, and a metallic lustre; that of the second is a black powder. Metallic chromium has not been applied to any use in the arts.

CHROMIUM, CHLORIDE OF. *Syn.* SESQUICHLORIDE OF CHROMIUM. *Prep.* I. Dissolve the hydrated oxide in muriatic acid, and evaporate to dryness.

II. Digest chromate of lead in muriatic acid mixed with a little alcohol, and throw down the excess of lead with sulphureted hydrogen.

III. Pass dry chlorine over a mixture of chrome oxide and charcoal heated to redness, in a porcelain tube. The chloride collects as a sublimate, of a peach or purple color.

Remarks. By the first process the product is a green powder, which, when heated to 400°, becomes purplish red, and then forms pure, dry chloride of chromium. This process should be performed in a tube filled with carbonic acid gas.

CHROMIUM, OXIDE OF. *Syn.* SESQUIOXIDE OF DITTO. *Prep.* To a solution of chromate of potash, add another of protonitrate of mercury as long as any precipitate falls down. This must be well washed in water, and heated to redness in an earthen crucible.

II. Expose bichromate of potash to a strong red heat, then wash out the potassa with water.

III. Expose bichromate of potash, mixed with half its weight of sulphur, as above.

Prep. A green powder, insoluble in water. Fused with borax or glass, it imparts a beautiful green color. The emerald owes its color to this oxide. With the acids it forms salts which also have a green color. These compounds may be made by adding equal parts of muriatic acid and alcohol to a boiling solution of chromate of potassa, in water, in small portions at a time, until the red tint disappears, and the liquid assumes a green color. Pure ammonia, in excess, should now be added, when a hydrated green oxide will subside, which, after being washed with water, may be dissolved in the acids. Oxide of chrome is much used in the manufacture of colored glasses and enamels, and in dyeing.

Remarks. The above appears to be the only oxide of chromium, in opposition to the assertion of Berzelius, that there is a protoxide and deutoxide.

CHRYSAMMIC ACID. *Prep.* Add 1 part of aloes to 8 of nitric acid of sp. gr. 1·37, and heat the mixture in an open vessel. When the first violent action is over, introduce the whole into a retort, and distil to two-thirds. Then add 4 parts more of nitric acid, and keep the mixture nearly at the boiling point for some days, or as long as gas is disengaged. Water should next be added, which will throw down impure chrysammic acid, while chrysolepic acid and oxalic acid will remain in solution. The precipitate must be well washed with water combined with potash, and purified by recrystallization. The crystals are next dissolved in water, and nitric acid added, when a golden yellow powder will be deposited, which is chrysammic acid.

Prop. Soluble in alcohol, ether, and hot acids; explodes by heat, and forms salts, called chrysammates, with the bases. The salt of potash, prepared as above, is a beautiful crystalline carmine red powder, and when slowly produced it forms beautiful small greenish golden crystals. The salts of soda and magnesia are similar. Ammonia forms, with chrysammic acid, a deep purple solution, which deposites dark green crystals. The other salts of this acid are all of great beauty, and mostly of various shades of red, and exhibit a golden lustre under the polishing steel.

CIDER. *Syn.* CYDER. POMATIUM. CIDRE, (*Fr.*) The fermented juice of the apple. Cider and perry were known to antiquity, and are mentioned by Pliny, who calls them the wine of apples and pears. Modern Europe is, however, indebted to the Moors of Biscay, who introduced its manufacture into Normandy, whence it spread into the other provinces of France, into England, Germany, Russia, and America. The best cider made at the present day is that of Normandy, Herefordshire, and New Jersey, (U. S.,) and, next, that of Devonshire and Somersetshire. The last is, however, very inferior. Cider is made in all the temperate climates of the world, where the heat is insufficient to produce the grape, and the cold not so great as to interfere with the growth of the apple.

The process of making cider varies in different parts of England, but in every case essentially consists of—the collection of the fruit; the expression and fermentation of the juice; and the storing and management of the fermented liquor.

The apples are crushed or ground in a mill, and the pulp placed in haircloth or coarse canvass bags, and subjected to powerful pressure; the liquor which runs off is put into casks, and freely exposed to the air in the shade, and allowed to ferment. This part of the process is carefully watched, and as soon as the sediment has subsided, the liquor is racked off into clean casks. Before winter the

casks are stored in a cellar, or other cool place, where the temperature is low and regular, and by the following spring the liquor is fit for use or bottling.

Remarks. Much of the excellence of cider depends upon the temperature at which the fermentation is conducted; but this is a point utterly overlooked by the manufacturers of this liquor. Instead of the apple-juice, as soon as expressed from the fruit, being placed in a cool situation, where the temperature should not exceed 50° of Fahr., it is frequently left exposed to the full heat of autumn. In this way much of the alcohol formed by the decomposition of the sugar is converted into vinegar, by the absorption of atmospheric oxygen, and thus the liquor acquires that peculiar and unwholesome acidity, known in the cider districts by the name of "*roughness.*" On the contrary, if the fermentation be conducted at a low temperature, nearly the whole of the sugar is converted into alcohol, and this remains in the liquor instead of undergoing the process of acetification. The acetous fermentation, or the conversion of alcohol into vinegar, proceeds most rapidly at a temperature of 95° Fahr., and at lower temperatures, the action becomes slower, until at 46° 50″ Fahr., no such change takes place. (Liebig.) It is therefore quite evident that if the saccharine juice of apples, or any other fruit, be made to undergo the *vinous* fermentation in a cool situation, less of the spirit resulting from the transformation of the sugar will be converted into acetic acid, and consequently more will be retained in an unaltered state in the liquor, and tend not only to improve its quality, but by its conservative and chemical action, to precipitate the nitrogenous substances, or exciters of future change. Independently of differences in the quality of the fruit, this is the principal cause of the superiority of the cider made by one person over another, living in the same district. The one has probably a cooler barn and cellar than the other to store his cider in. In practice it has been found that sour and rough-tasted apples produce the best cider. This arises because they contain less sugar and more malic acid, and the presence of the latter impedes the conversion of alcohol into vinegar. But cider made with such apples can never equal in quality that prepared *at a low temperature* from fruit *abounding in sugar.* In Devonshire the pressing and fermentation are conducted in situations where the temperature varies but little from the external air, and fluctuates with all its changes; the result is that Devonshire cider, of the best class, will rarely keep more than 5 or 6 years, and seldom improves after the second or third year, while the cider of Herefordshire and Worcestershire, where these operations are more carefully attended to, will keep for 20 or 30 years.

In the cider counties the culture of the apple engages especial attention. Dry rising ground, sheltered from the northerly and easterly winds, is best suited for an orchard. The fruit, after being gathered, is usually left for 14 or 15 days, in a barn or loft, to mellow or mature, during which time a considerable portion of the mucilage is decomposed, and alcohol and carbonic acid developed. The spoiled apples should then be separated from the sound ones, as they not only impart a bad flavor to the cider, but prevent its spontaneous clarification. Unripe apples should also be avoided, as they do not contain sufficient sugar to undergo the vinous fermentation, while they contribute to render the liquor rough and acidulous. Sour and rough-tasted apples are usually preferred by farmers for making cider, but fruit abounding in sugar would be preferable, provided the same skill were exercised in the manufacture of cider as in the process of brewing malt liquor.

As the juice of apples contains less sugar in proportion to the amount of acid and nitrogenized matter than that of grapes, the addition of some of this article would render it more suitable for the production of a vinous liquor. Good West India sugar is the best for this purpose. I have tasted cider made in this way, and that had been stored in fresh emptied rum puncheons, that had all the pungency and vinosity of foreign wine.

The best cider yields about 9 or 10% of real alcohol. Ordinary cider from 4 to 6%.

CIDER, DEVONSHIRE. The apples, after being plucked, are left in heaps in the orchard for some time, to complete their ripening, and render them more saccharine. They are then crushed between grooved cylinders, surmounted by a hopper, or in a circular trough, by two vertical edge-wheels of wood moved by a horse; after passing through which, they are received into large tubs or cives, and are then called pommage. They are afterwards laid on the vat in alternate layers of the pommage and clean straw, called reeds. They are then pressed, a little water being occasionally added. The juice passes through a hair sieve, or similar strainer, and is received in a large vessel, whence it is run into casks or open vats, where every thing held in mechanical suspension is deposited. The fermentation is often slow of being developed; though the juice be set in November or December, the working sometimes hardly commences till March. Till this time the cider is sweet; it now becomes pungent and vinous, and is ready to be racked for use. If the fermentation continue, it is usual to rack it again into a clean cask that has been well sulphured out, and to leave behind the head and sediment; or two or three cans of cider are put into a clean cask and a match of brimstone burned in it: it is then agitated, by which the fermentation of that quantity is completely stopped. The cask is then nearly filled, the fermentation of the whole is checked, and the cider becomes fine. If, on the first operation, the fermentation is not checked, the process of racking is repeated until it becomes so, and is continued from time to time till the cider is in a quiet state and fit for drinking.

A common practice in Devonshire is to add a stuff called "*stum,*" sold by the wine-coopers, or an article called "*anti-ferment,*" sold by the druggists, for the purpose of checking the fermentation, but a much better plan is to *rack*, as above described, into a well-sulphured cask, and to add 5 or 6 oz. of mustard-seed, and ½ oz. cloves, both well bruised; racking into a fresh-emptied spirit cask is also a good plan.

About six sacks, or twenty-four bushels of apples, are used for a hogshead of 63 gallons. If the weather be warm, it will be necessary to carry on the process in the shade, in the open air, and by every means to keep the juice as cool as possible

In nine months it will usually be in condition for bottling or drinking; if it continues thick use some isinglass finings, and if at any time it ferments and threatens acidity, the cure is to rack it, and leave the head and sediment behind.

CIDER, CHAMPAGNE. *Prep.* Good pale vinous cider 1 hogshead; proof spirit (pale) 3 gallons; honey or sugar 14 lbs.; mix, and let them remain together in a temperate situation for 1 month; then add orange-flower water 1 quart; and fine it down with skimmed milk ½ a gallon.

Remarks. This will be very pale; and a similar article, when bottled in champagne bottles, silvered, and labelled, has been often sold to the ignorant for champagne. It opens very brisk, if managed properly.

CIDER CHEESE. The residuum or cake of pommage or bruised apples, from which the juice has been expressed. It forms excellent food for pigs, and is very acceptable to them.

CIDER, FRENCH. After the fruit is mashed in a mill, between iron cylinders, it is allowed to remain in a large tun or tub for 14 or 15 hours, before pressing. The juice is placed in casks, which are kept quite full, and so placed upon gawntrees, or stillions, that small tubs may be put under them, to receive the matter that works over. At the end of 3 or 4 days, for *sweet cider*, and 9 or 10 days for *strong cider*, it is racked into sulphured casks, and then stored in a cool place.

CIDER, MANAGEMENT OF. Cider should be stored in a cool place, and should not be drunk before it becomes sufficiently mature. To improve the flavor of a hogshead of cider, 1½ gallons of good brandy or rum are frequently added, with 2 oz. of powdered catechu, (dissolved in water,) 7 lbs. of good moist sugar or honey, ½ oz. each of bitter almonds and cloves, and 4 oz. of mustard seed. These must be well rummaged in, and occasionally stirred up for a fortnight, after which it must be allowed to repose for 3 or 4 months, when it will usually be found as bright as wine. Should this not be the case, it must be fined with a pint of isinglass finings, or a dozen eggs, and in a fortnight more it will be fit for use. If the cider be preferred pale, omit the catechu, and instead of isinglass fine with a quart of skimmed milk. If wanted of a light reddish, or rose tint, use ½ oz. of cochineal, and omit the catechu.

Preparatory to bottling cider it should be examined, to see whether it be clear and sparkling. If not it should be clarified in a similar way to beer, and left for a fortnight. The night before it is intended to put it into bottles, the bung should be taken out of the cask, and left so until the next day, when it may be bottled, but not corked down until the day after, as, if this be done at once, many of the bottles will burst by keeping. The best corks, and champagne-bottles should be used, and it is usual to wire and cover the corks with tinfoil, after the manner of champagne. A few bottles may be kept in a warm place to ripen, or a small piece of lump sugar may be put into each bottle before corking, if the cider be wanted for immediate use, or for consumption during the cooler portion of the year, but for warm weather and for long keeping this is inadmissible. The *bottled stock* should be stored in a cool cellar, when the quality will be greatly improved by age. Cider for bottling should be of good quality, and at least 18 months old.

CIDER, MADE. An article under this name is made in Devonshire, for the supply of the London market, it having been found that the ordinary cider will not stand a voyage to the metropolis without some preparation. The finest quality of made cider is only ordinary cider racked into a clean cask, and well sulphured; but the mass of that which is sent to London, is mixed with water, treacle, and alum, and then fined down, after which it is racked into well-matched casks. The larger portion of the cider sold in London, professing to be Devonshire cider, would be rejected even by the farmers' servants in that county.

CIDER MOIL. *Syn.* WATER MOIL. A weak cider or liquor, prepared by adding water to the pressed cake, and fermenting. Very inferior.

CIDER, RAISIN. This is made in a similar way to raisin wine, but without employing sugar, and with only 2 lbs. of raisins to the gallon, or even more, of water. It is usually fit for bottling in 10 days, and in a week more is ready for use.

CIDER-SPIRIT. *Syn.* CIDER BRANDY. Obtained from cider by distillation. It is largely manufactured in America, where a very decent article may be purchased for about 50 cents per gallon, at proof. An illicit distillation of this spirit is frequently carried on by the farmers in the west of England.

CIGARS, MERCURIAL. M. Paul Bernard lately proposed to the Académie de la Médecine the use of cigars impregnated with a weak solution of bichloride of mercury, for persons afflicted with syphilitic affections of the throat and palate, as a mode of conveying mercurial fumigation. It has been proposed first to deprive the tobacco of its nicotin by frequent washings. (Lancet, May 13, 1843.)

CINCHONA BARK. There are three kinds of cinchona bark employed in medicine; the cortex cinchonæ lancifoliæ, (of the London and Dublin Pharmacopœias,) or the cortex cinchonæ condaminea, (of the Ed. Ph.,) commonly known in commerce as pale, crown, loxa, or quillbark; the cortex cinchonæ cordifoliæ, (Lond. and Dub.,) or the cortex cinchonæ flavæ, (Edin.,) commonly known as yellow or royal yellow bark; and the cortex cinchonæ oblongifoliæ, (Lond. and Dub.,) or red cinchona bark, (Edin.;) medically considered, they are all tonic and febrifuge, and may be given in powder, from 20 grs. to ℥ij, every two or four hours, so as to get down an ounce between each fit of intermittent fever; used also to stop the progress of gangrene; they are also given in infusion and decoction. Since the introduction of the cinchona alkaloids, the employment of bark in substance has considerably lessened.

Pur. The officinal species of cinchona bark are frequently imported mixed with other kinds, that contain less of the febrifuge principle. The most common adulteration is, however, the admixture of the same drug that has been exhausted of its active portions. This method consists in employing the bark, but slightly broken, (or generally whole, as imported,) for the manufacture of sulphate of quinine, cinchonine, and tincture, infusion, decoction, and extract of bark, after which it is carefully dried, without injury to its color, and

mixed up with fresh bark for sale, or is sent to the mill to be ground into powder. The greater amount of adulteration is generally practised on the powder, on account of the fraud being less easily detected when the drug is in the pulverulent state. Not only is the worst description of bark chosen for grinding, frequently largely admixed with exhausted bark, as just mentioned, but "the roots of bistort, calamus aromaticus, avens, water-avens, and tormentil; oak bark, that of several kinds of willow, horse-chesnut, ash, and the sloe bush; mahogany sawdust, the dried herbs of yellow loosestrife, bugle, water-horehound, and self-heal, are used either as substitutes or to reduce the price of the ground bark; as is also the root of Geum montanum. The barks of Pinknea pubescens, Unnona febrifuga, Swietenia febrifuga, Cedrela tuna, Magnolia glauca, M. acuminata, M. tripetala, Achras sapota, Rubus trivialis, and R. villosus, are also used as substitutes," (Gray;) and, in fact, any trash that will possibly produce a powder at all resembling that of bark, or that can be made so by grinding and the addition of coloring.

Tests. The simplest and only certain method of ascertaining the quality of cinchona bark, and of detecting fraudulent admixture, is by an assay for the alkaloid. (See QUINOMETRY.) The tannic acid which exists in every species of cinchona bark, may be recognised by its precipitating the sesquichloride of iron of a green color, gelatine of a whitish color, and a solution of tartar emetic of a *dirty* white.

CINCHONIA. *Syn.* CINCHONINE. CINCHONINA. CINCHONIUM. An alkaline principle extracted from pale cinchona bark, in the same way as quinine is from yellow cinchona bark.

Prep. I. Add ammonia to a dilute solution of sulphate of cinchonine, as long as any precipitate falls. Wash with cold water, dissolve in alcohol and crystallize.

II. A pound of bruised bark is boiled in about a gallon of water, to which 3 fluid drachms of sulphuric acid have been previously added. A similar decoction is repeated with about half the quantity of liquid, and so on till all the soluble matter is extracted. The decoctions are then mixed together, and strained; and powdered slaked lime is added, in a proportion somewhat greater than necessary to saturate the acid; the precipitate that ensues (a mixture of cinchonina and sulphate of lime) is collected, dried, and boiled for some minutes in strong alcohol, which is then decanted off while still hot, and fresh portions successively added for the repetition of the same operation, until it ceases to act on the residuum, which is then merely sulphate of lime. The different alcoholic solutions are then put into a retort or still, and considerably evaporated, during which, and especially on cooling, acicular crystals of cinchonina are deposited. When the whole is thus collected, the crystals, if yellow or discolored, must be again dissolved in boiling alcohol, and thus, by recrystallization, they will be obtained colorless. (Brande's Manual of Pharm.)

III. Boil Peruvian bark in alcohol until all the bitterness is extracted; distil to dryness, dissolve the extract in boiling water, rendered very sour, with muriatic acid; add calcined magnesia, boil for a few minutes till the liquor is clear; when cold, filter, wash the sediment left on the filter with cold water, dry it, boil alcohol upon it until all the bitterness is extracted; pour off the alcohol, and, as it cools, the cinchonine will crystallize. It may be purified by solution in a very weak acid, and the addition of an alkali.

Prop. and Uses. These are similar to quinine It is, however, rather less soluble in water than that alkaloid, as it requires 2500 parts of water, at 60°, for its solution. It forms salts with the acids, all of which may be made in the same manner as those of quinine. The neutral sulphate, bisulphate, disulphate, muriate, nitrate, iodide, iodate, &c. have been formed and examined.

Purity and Tests. (See QUININE.)

CINNAMMIC ACID. A substance discovered by Dumas and Peligot in oil of cinnamon. It crystallizes out of the oil when long exposed to the atmosphere.

Prep. Dissolve oil of balsam of Peru in potassa water, evaporate to dryness, dissolve the residuum in boiling water, and add an excess of muriatic acid. The cinnammic acid is deposited in crystals as the solution cools, and may be purified by re-solution and crystallization.

II. By cautious distillation of balsam of Tolu by a gentle heat it fuses, and a little water and volatile oil first comes over, followed by cinnammic acid, in the form of a heavy oil, which condenses on the cool parts of the neck of the retort, as a white crystalline mass. Towards the end of the process, some empyreumatic oil distils over. The acid must be purified by pressure between the folds of filtering paper and solution in boiling water. On cooling, minute colorless crystals of cinnammic acid will be deposited. Pure balsam of Tolu yields about ⅙ of its weight of this acid. (Mr. Heaver in the Ann. Chym.)

Prop. Colorless transparent scales, or prisms, scarcely soluble in water, but freely so in alcohol. Fuses at 240°; volatilizes unchanged at 555°. It forms salts with the bases, called cinnammates, which generally resemble the benzoates.

CINNAMEINE. *Syn.* OIL OF BALSAM OF PERU. *Prep.* Add an alcoholic solution of balsam of Peru, to a like solution of potassa. A compound of resin and potassa is precipitated, and cinnammate of potassa and cinnaméine are left in solution. On adding water, the latter separates and floats upon the surface.

II. Add 2 measures of balsam of Peru to 3 of liquor of potassa, (sp. gr. 1·300,) apply a gentle heat, when a yellowish brown oil will separate and float above a heavy black liquid, containing the potash. The former must be collected, and may be purified by cautious distillation.

Prep., &c. It dissolves in alcohol and ether, and by the action of alkalis is converted into cinnammic acid.

CINNAMON. From the high price of this drug, it has become a general practice to substitute cassia for it, which so exceedingly resembles it that most persons, unacquainted with the drug, regard them as the same. Cassia is, however, not only thicker and coarser than cinnamon, but its fracture is short and resinous, and its flavor is more biting and hot, while it lacks the peculiar sweetish taste of the latter spice. The thickness of cinna

men seldom exceeds that of good drawing paper. The same remarks are also applicable to the oil and powder. In pharmacy it is a general practice to employ cassia and its preparations whenever those of cinnamon are ordered. Both these drugs are wholesome aromatics. The principal consumers of genuine cinnamon are the chocolate-makers of France, Spain, Italy, and Mexico. The Germans, Turks, and Russians prefer chocolate flavored with cassia. "Some cinnamon, sent to Constantinople by mistake, proved unsaleable at any price, while cassia, worth about sixpence per pound, was in great request." (Pereira.)

CITRATES. Salts formed of the citric acid and the bases.

Prep. Those in general use may be all made by the addition of either the hydrate, oxide, or carbonate of the base, to a solution of the acid in water, until the latter be neutralized, when crystals may generally be obtained by evaporation.

Prop., &c. The citrates are mostly soluble, and when heated, froth, blacken, and are decomposed. When an anhydrous citrate is decomposed by an alcoholic solution of hydrochloric acid, the citric acid is principally transformed into hydrated aconitic acid.

Char. and Tests. The citrates are characterized by giving a white precipitate with acetate of lead, soluble in ammonia, and also a white precipitate with nitrate of silver, which, by the application of heat, froths up, deflagrates, and leaves an abundant ash, which, on increasing the heat, becomes pure silver.

Remarks. The principal citrates are *citrate of ammonia*, (soluble and crystallizable;) *citrate of potash*, (very soluble and deliquescent;) *citrate of soda*, (large crystals, soluble;) *citrate of baryta*, (beautiful shining silvery bushes, scarcely soluble;) *citrate of lime*, (see CITRIC ACID;) *magnesia*, *alumina*, and *protoxide of manganese*, each form 2 salts with citric acid, one soluble, the other insoluble; *citrate of protoxide of iron*, (scarcely soluble and crystallizable;) *percitrate of iron*, (soluble and brown;) *ammonio-citrate of iron*, (garnet colored, very soluble;) *citrate of zinc*, (scarcely soluble;) *citrate of lead*, (insoluble white powder;) *citrate of copper*, (green powder;) *citrate of silver*, (brilliant white powder;) *potassio-citrate of antimony*, (dazzling white prisms.)

CITRATE, OR AMMONIO-CITRATE OF IRON. *Syn.* AMMONIO-CITRATE OF PEROXIDE OF IRON. FERRO-CITRATE OF AMMONIA. PERCITRATE OF IRON AND AMMONIA. There are three salts generally known under this name—two, having the peroxide for their base, and one, the protoxide. There is also a fourth, formed from the magnetic oxide of iron, which has scarcely been introduced into this country, though commonly employed in France, and highly recommended by Béral. The salt at present so much advertised as citrate of iron, is a double citrate of iron and ammonia—an ammonio-citrate, and as such I shall describe it. I find that several other double citrates of iron may be prepared, but they are possessed of inferior qualities to those just mentioned. They therefore offer no inducement for their manufacture.

I. This salt is most conveniently formed by dissolving moist hydrated peroxide of iron in liquid citric acid, (pure,) assisting the solution by heat, and then bringing it to a perfectly neutral state by the addition of a little sesquicarbonate of ammonia. It must then be filtered, cooled, and spread very thinly on warm sheets of glass to dry, which it will rapidly do, and may then be easily detached from the glass, in thin scales, or lamellæ, of great brilliancy and beauty. Only a gentle heat must be employed, not exceeding that of a water-bath. This is the mystery of producing those beautiful transparent ruby-colored scales which are so much admired.

II. Competition in the sale of this article has induced the manufacturer to adopt a cheaper formula than that originally published by Béral and employed by many houses. It is now generally prepared by placing together, for some days, in a warm situation, a mixture of iron filings, and citric acid in powder, with barely sufficient water to cover them, occasionally stirring and replacing the water as it evaporates. A saturated solution is made in distilled water, there being previously added more citric acid, (about half the weight of the acid first used,) if required; it is then neutralized with liq. ammon. fort., (about 1¼ oz. of liquor of ammonia, sp. gr. ·882, to every gallon of the solution of sp. gr. 1·025,) and concentrated by evaporation: the same plan mentioned above is then followed, to complete the process. The first part of this process produces a salt of the protoxide of iron, which is afterwards converted, by exposure to the atmosphere, into a citrate of the magnetic oxide, and lastly into citrate of peroxide of iron.

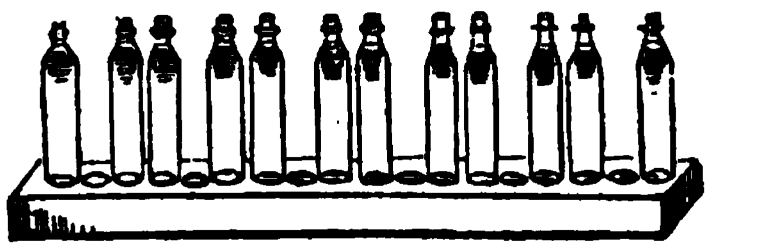
Remarks. This beautiful salt is of a rich ruby color, and may be obtained under the form of glistening transparent scales, very soluble in aqueous menstrua, while its solution is not so easily decomposed as that of many other salts of iron. It is nearly tasteless, and highly deliquescent. The absurd statements put forth in advertisements respecting this preparation being compatible with the volatile and fixed alkalis and their carbonates, &c., I find to be incorrect; for on adding some liquor potassæ to a solution of this salt, it immediately became turbid, exhaled ammonia in large quantities, and deposited oxide of iron. I found the same take place with the carbonate; and no doubt, had I extended the experiments to the other articles mentioned as compatible, I should have met with another similar result. It is doubtful whether this article has not obtained a larger sale from its pleasing appearance, than from its medicinal virtues. I know several parties who have prepared this salt in lumps or powder, by simple evaporation of the solution to dryness, who have been unable to sell it under that form, even at a lower price.

M. Béral, in his directions for the preparation of this salt, directs a platina capsule to be used, as well as attention to other minutiæ, which I find quite unessential to the success of the operation. Glass, Wedgewood ware, or even metallic vessels may be employed; the former, however, are preferable. I find that boiling water will dissolve about twice its weight of citric acid, and retain $\frac{1}{2}\frac{1}{0}$ of this quantity in solution when cold, and that it takes rather more than twice the weight of the citric acid, in most hydrated protoxide of iron, to produce saturation.

We may, therefore, with great advantage, em-

This forms the proof solution, which, if mixed with 6 or 8 parts of water, is quite colorless, but chloride of lime occasions the production of peracetate of iron, which gives it a red color.

The above proof-solution is then poured into 12 two-oz. vials, of exactly equal diameters, to the amount of $\frac{1}{5}$ of their capacity; these are filled up with bleaching liquid of various strengths; the first at $\frac{1}{12}$ of a degree of Twaddle, the second $\frac{2}{12}$, and so on up to $\frac{12}{12}$ or 1°. They are then well corked up, and, after agitation, arranged side by side on a tray, furnished with holes to receive them, in the manner represented in the engraving. A se-



ries of test vials are thus formed, showing the various shades of color that the solutions of the given strengths are capable of producing. To ascertain the strength of an unknown sample of bleaching liquor, the proof solution of iron is put into a vial, exactly similar to the 12 previously used, and in precisely the same proportion, ($\frac{1}{5}$.) The vial is then filled up with the bleaching liquor, well shaken, and placed beside that one of the 12 already prepared which it most resembles in color. The number on that vial expresses the strength of the sample under examination, in $\frac{1}{12}$ths of a degree of Twaddle's hydrometer.

Table exhibiting the quantity of Bleaching Liquid, at 6° on Twaddle's scale, (sp. gr. 1·030,) required to be added to a weaker liquor, to raise it to the given strengths. Adapted from Mr. Crum's table by Mr. Cooley.

Strength of sample in $\frac{1}{12}$°.	Required Strength.	Proportions required. Given Sample.	Liquor at 6°.
		Parts.	Part.
Water.	$\frac{8}{12}$°	8	1
1	do.	$9\frac{1}{4}$	1
2	do.	11	1
3	do.	$13\frac{1}{2}$	1
4	do.	17	1
5	do.	23	1
6	do.	35	1
7	do.	71	1
Water.	$\frac{6}{12}$°	11	1
1	do.	$13\frac{1}{2}$	1
2	do.	17	1
3	do.	23	1
4	do.	35	1
5	do.	71	1
Water.	$\frac{4}{12}$°	17	1
1	do.	23	1
2	do.	35	1
3	do.	71	1
Water.	$\frac{3}{12}$°	23	1
1	do.	35	1
2	do.	71	1

Remarks. The preceding method is admirably suited for weak solutions, such as are employed for bleaching textile fabrics, and is well adapted (from its simplicity) to the purposes of practical men. It is employed in many of the Scotch bleaching houses.

According to Mr. Crum, the range of strength within which cotton is safe, is very limited. A solution at 1° of Twaddle's scale, (sp. gr. 1·005,) is not more than safe, while one at $\frac{1}{2}$° is scarcely sufficiently strong for the first operation on stout cloth, unless it be packed more loosely than usual. (Trans. Glasgow Phil. Soc.)

III. (*Ure's test.*) This consists in adding water of ammonia of a known strength, tinged with litmus, to a solution of a given weight of the chloride, until the whole of the chlorine be neutralized, which is known by the color ceasing to be destroyed. From the quantity of ammonia consumed, the strength is estimated. During the above process azote is evolved, and the estimation of the volume thus liberated has been proposed as another easy method of chlorimetry by Dr. Ure.

This gentleman recommends the two substances to be mixed in an inverted and graduated syphon tube over mercury. (See Engraving.) "The shut end *a* and the open end *b*, are both graduated to one scale; for example, to $\frac{1}{100}$ of an inch, or to grain or 10 grain measures. The tube is to be filled with mercury, and then 10 measures of it are to be displaced at the open end, by inserting a wooden plug. This space being filled with a solution of a given weight of chloride of lime, is to be turned up into the shut end, by covering the open end with the finger and inverting the tube; a few drops of water may be sent through to wash the mercury. The ammonia being now let up will cause a reaction, and evolve a quantity of azote, equivalent to the chlorine present. The action may be accelerated by holding the sealed end of the tube over the flame of a spirit-lamp. The mercury is protected from the chlorine by the ammonia; and should any notion be entertained of such an action, the ammonia may be let up first. I have made innumerable researches over mercury, with a detached apparatus of this kind, which combines precision with rapidity of result." (Ure's Dict. Arts.)

IV. (*Process of M. Gay Lussac.*) One part of the best indigo is dissolved in 9 parts of strong sulphuric acid, by the aid of a gentle heat. This solution is then mixed with distilled water, in such proportion, that 1 volume of chlorine gas shall exactly decolor 10 volumes of this solution. Each measure so decolored is called a degree, and each degree is divided into fifths. 5 grains of the best chloride of lime, dissolved in 500 grain measures of water, will possess the above power, and indicate 10° or proof, and will decolor 10 times its volume of the indigo solution. The objections to this method of chlorimetry are, that the indigo solution alters by keeping, and that it is not adapted for testing strong solutions of chloride of lime. "I have tried the indigo test in many ways, but never could confide in it." (Ure.)

CHLORO-NITROUS GAS. A gaseous compound, discovered by E. Davy. It is obtained

by treating fused chloride of sodium, potassium, or calcium, in powder, with as much strong nitric acid as is sufficient to wet it, when this gas is evolved. *Prop.* It has an orange color, smells like chlorine, and bleaches. Soluble in water.

CHLOROPHYLL. *Syn.* CHLOROPHILE. CHLOROPHYLE. The green coloring matter contained in the leaves, stalks, unripe fruit, and juices of most plants. It is extracted by ether, and purified by successive solutions in alcohol and muriatic acid; from the last it is precipitated pure by water.

Prop. A dark green mass, producing a grass-green powder. It is soluble in ether, alcohol, acids, alkalis, and oils. If an earthy or metallic salt be mixed with the alcoholic solution, and an alkaline carbonate be added, the earth or oxide is thrown down in combination with this coloring matter, forming a green lake, possessing considerable permanency. Pelletier and Caventou, who first discovered chlorophyll, obtained it by simply pressing the leaves, washing in water, and afterwards treating it with alcohol.

CHLOROUS ACID. *Syn.* PEROXIDE OF CHLORINE. A compound of oxygen and chlorine. *Prep.* Chlorate of potassa in fine powder, made into a paste with strong sulphuric acid, is put into a retort and heated in a water-bath, hot but not boiling. A yellowish green gas is given off, which may either be collected in dry bottles, or passed into water, when it will form liquid chlorous acid.

Props., &c. Its aqueous solution undergoes gradual decomposition, yielding chlorine and chloric acid. It possesses powerful oxidizing and bleaching properties, and unites with the bases forming salts called chlorites. These are all soluble in water, and possess bleaching powers like the acid. They may be recognised by the evolution of chlorous acid gas when acted on by an acid.

CHOCOLATE. *Syn.* CHOCOLADA. CHOCOLAT, (*Fr.*) The roasted cacao nut made into a paste by triturating it in a heated mortar, with sugar and aromatics, and cast in tin moulds, in which it concretes into cakes on cooling. The term is derived from two Indian words, *choco*, sound, and *atte*, water; because of the noise made in its preparation. (Dr. Alston.)

Qual. Chocolate is nutritive and wholesome, if taken in moderation, but is sometimes apt to disagree with weak stomachs, especially those that are easily affected by oily substances or vegetable food. The quantity of aromatics mixed with the richer varieties, improve the flavor, but render them more stimulant and prone to produce nervous symptoms, and complaints of the head.

Prep. The nuts are first roasted, (on the small scale this may be done in a frying-pan,) and after being cleared from the husks, reduced to coarse powder; they are then beaten in an iron mortar, the bottom of which is heated, until they are reduced to a paste, which is effected by the action of the heat on the oil or butter they contain. This paste or semi-fluid mass is then poured out into moulds, and left until cold, when it forms *cake chocolate*, or *chocolate paste;* or it may be reduced to coarse powder, by grinding, when it is known under the name of *chocolate powder*.

Remarks. Chocolate, prepared as above, without the addition of aromatics, is known in the trade as *plain chocolate*. The Spaniards flavor it with vanilla, cloves, and cinnamon, and frequently scent it with musk and ambergris. In general, they add too large a quantity of the last four articles. The Parisians, on the contrary, use but little flavoring, and that principally vanilla. They employ the best caracca nuts, and add a considerable quantity of refined sugar.

The mass of the common chocolate sold in England, is prepared from the cake left after the expression of the oil, and this is frequently mixed with the roasted seeds of ground peas, and maize or potato flour, to which a sufficient quantity of inferior brown sugar, or treacle and mutton suet is added, to make it adhere together. In this way is made the article commonly marked in the shops at 8*d.*, 9*d.*, and 10*d.* the pound. I know a person who lately bought a large quantity at 5*d.*, whereas good nuts, in their unprepared state, cost at wholesale more than double the money.

To excel in the manufacture of chocolate requires some little experience. The roasting of the nuts must be done with great care, and the process stopped as soon as the aroma is well developed. They should then be turned out, cooled, and fanned from the husks. On the large scale, chocolate is made in mills, worked by steam power, and the machinery employed in the grinding, admirably fulfils its duty.

The South American beans are esteemed the best for making chocolate. Like wine, it improves by age, if kept in a dry but not too warm a place.

CHOCOLATE CREAM. *Prep.* Chocolate scraped fine 1 oz.; thick cream 1 quart; sugar (best) 6 oz.; heat it nearly to boiling, then remove it from the fire, and mill it well. When cold, add the whites of 8 or 10 eggs; whisk rapidly, and take up the froth on a sieve; serve the cream in glasses, and pile up the froth on the top of them.

CHOCOLATE DROPS. Reduce 1 oz. of chocolate to fine powder by scraping, and add it to 1 lb. of finely-powdered sugar; moisten the paste with clear water, and heat it over the fire until it runs smooth, and will not spread too much when dropped out; then drop it regularly on a smooth plate. Avoid heating it a second time.

CHOCOLATE FOR ICING. *Syn.* SORBET AU CHOCOLAT. *Prep.* Rub 2 oz. of chocolate to a paste with 2 tablespoonfuls of hot milk, then add cream for icing 1 quart. Ice as wanted for use.

CHOCOLATE FOR THE TABLE. *Prep.* Put the milk and water on to boil; then scrape the chocolate fine, from one to two squares to a pint, to suit the stomach: when the milk and water boils, take it off the fire, throw in the chocolate, mill it well, and serve it up with the froth, which process will not take five minutes. The sugar may either be put in with the scraped chocolate, or added afterwards.

It should never be made before it is wanted; because heating again injures the flavor, destroys the froth, and separates the body of the chocolate; the oil of the nut being observed, after a few minutes' boiling, or even standing long by the fire, to rise to the top, which is the only cause why chocolate can offend the most delicate stomach.

CHOCOLATE, FRENCH. *Prep.* Finest ca-

The cheese is next turned out and surrounded by a fres i cheese-cloth, and pressure again applied for 8 or 10 hours, when it is commonly removed from the press, salted all over, and pressed again for 15 to 20 hours. The quality of the cheese especially depends on this part of the process, as if any of the whey be left in the cheese, it will not keep, but will rapidly become bad-flavored. Before placing it in the press the last time, the edges should be pared smooth and sightly. It now only remains to wash the outside of the cheese in warm whey or water, wipe it dry, and color it with annotto as is usually done.

There are several methods of collecting the curd adopted, and as the flavor of the cheese varies accordingly, it is as well to notice them. One way is to break the curd early, and to remove the whey as soon as possible; another plan is to gather it with the hands very gently towards the sides of the tub, letting the whey run off through the fingers until it becomes cleared, and ladling it off as it collects. A third method is to remove it as quickly as possible with the curd-skimmer. Of these the second plan is said to be the best, as it preserves the oily particles, many of which are lost by the other methods.

The cheese being made, it now only remains to place it in a proper situation to mature or ripen. In England a *cool, and slightly damp cellar*, is commonly regarded as the best to bring it forward. The temperature should on no account exceed 50° at any portion of the year, but an average of about 45° is preferable when it can be procured. A place exposed to sudden changes of temperature is unfit for storing cheese. "The quality of Rochefort cheese, which is prepared from sheep's milk, and is very excellent, depends exclusively upon the places where the cheeses are kept after pressing and during maturation. These are cellars, communicating with mountain grottoes and caverns, which are kept constantly cool, at about 41° to 42° Fahr., by currents of air from clefts in the mountains. The value of these cellars as storehouses varies with their property of maintaining an equable and low temperature. Giron (Ann. de Chim. et Phys. xlv. 371) mentions that a certain cellar, the construction of which had cost 480*l.*, (12,000 francs,) was sold for 8,600*l.*, (215,000 francs,) being found to maintain a suitable temperature, a convincing proof of the importance attached to temperature in the preparation of these superior cheeses." (Liebig's Lectures.)

It will thus be seen that very slight differences in the materials, the preparation, or the storing of cheese, will materially influence the quality and flavor. The richness of the milk,—the addition to or subtraction of cream from the milk,—the separation of the curd from the whey with or without compression,—the salting of the curd,—the collection of the curd, either whole or broken, before pressing,—the addition of coloring matter, as annotto or saffron, or of flavoring,—the place and method of storing,—and the length of time allowed for maturation, all tend to alter the taste and odor of the cheese, in some or other particular, and that in a way readily perceptible to the refined palate. The nature of the pasture or the food on which the cows are fed, as well as their particular breed, no doubt also tends in some slight degree to promote the same diversity of flavor and quality. No other alimentary substance appears to be so materially affected by slight variations in the quality of the materials from which it is made, or by such apparently trifling differences in the methods of preparing it.

Var. There are several varieties of cheese met with in trade, differing from each other in quality or flavor; and these are generally distinguished by the names of the places where they have been manufactured, and sometimes, though more rarely, by their flavor, or the milk from which they are manufactured. Three divisions may however be made, depending upon the quality of the materials, each of which is well marked, and to one or the other all kinds of cheese belong. These are *skimmed-milk, raw-milk*, and *cream cheeses*, the names of which respectively express the materials of which they are made. The following are the principal cheeses met with in Europe.

Brickbat cheese, made in Wiltshire of new milk and cream. This name is given to it from its being made into forms resembling brickbats.

Chedder cheese, named after the place where it is made. This is a fine kind of cheese, with a spongy appearance, the eyes or vesicles of which contain a rich oil. It is made up into round thick cheeses of considerable size.

Cheshire cheese. The best Cheshire cheese is made of new milk without skimming, the morning's milk being mixed with that of the preceding evening, previously warmed, so that the whole may be brought to the heat of new milk. To this the rennet is added, in less quantity than is commonly used for other kinds of cheese. On this point, much of the flavor and mildness of the cheese is said to depend. A piece of dried rennet, of the size of half-a-crown, put into a pint of water over night, and allowed to stand until the next morning, is sufficient for 18 or 20 gallons of milk. The curd is next broken down and separated from the whey, after which it is put into a cheese vat and pressed very dry. It is next broken very small with the hands, and mixed with a proper quantity of salt, and about half its weight of curd, from yesterday's batch, kept for the purpose. The mixed curds are now pressed tightly with the hands, into a cheese-vat, previously lined with cheese cloth, pressed for 4 or 5 hours, then taken out, turned, and again put into the press and left for the night. It is taken out next morning, well salted, and left until the salt is quite melted, when it is wiped dry, placed in a dry, cool situation, and turned every day until it becomes fit for the market.

"If the milk be set together very warm, the curd will be firm: in this case, the usual mode is to take a common case-knife, and make incisions across it, to the full depth of the knife's blade, at the distance of about 1 inch; and again crosswise in the same manner, the incisions intersecting each other at right angles. The whey rising through these incisions is of a fine pale green color. The cheese-maker and two assistants then proceed to break the curd: this is performed by their repeatedly putting their hands down into the tub; the cheese-makers, with the skimming-dish in one hand, breaking every part of it as they catch it, raising the curd from the bottom, and still breaking

it. This part of the business is continued till the whole is broken uniformly small; it generally takes up about 40 minutes, and the curd is then left covered over with a cloth for about half an hour to subside. If the milk has been set cool together, the curd, as before mentioned, will be much more tender, the whey will not be so green, but rather of a milky appearance." (Cheshire County Agricultural Report.)

Cream cheese. This is either made of the "strippings," (the last of the milk drawn from the cow at each milking,) or of a mixture of milk and cream. It is usually made up into small pieces, and a gentle pressure, as that of a 2 or 4 lb. weight, applied to press out the whey. After twelve hours, it is placed upon a board or wooden trencher, and turned every day, until dry. In about three weeks, it will be ripe. Nothing but raw cream, turned with a little rennet, is employed, when a *very rich* cheese is wanted. A little salt is generally added, and frequently a little powdered lump sugar. The vats employed for cream cheeses are usually square, and of small size.

Cottenham cheese, named from the town where it is made, is a species of cream cheese, superior to Stilton, from which it also differs in shape, being flatter and broader than the latter. Its superiority is said to be derived from the rich grasses growing on the fens of Cambridgeshire.

Derbyshire cheese is a small rich variety, of a pale color, very similar to the following:

Dunlop cheese, named after a town in Ayrshire, where it was originally made. It is very rich, white, and buttery, and is made up into round forms, weighing from ¼ cwt. to ½ cwt. It is now made very generally throughout the whole of Scotland.

Dutch cheese. This is very commonly met with in England, and is readily distinguished by its globular form. The cheeses made at Edam are very highly salted; those made at Gouda are less so. The common size of these cheeses is from 5 to 14 lbs.

French cheese. The Rochefort and the Neufchatel are the most esteemed.

German cheese. The only kind made in Germany of any celebrity, is the *Westphalian,* which derives its peculiar flavor from the curd being allowed to become partially putrid before being pressed. It is made up into small balls or cylinders, of about a pound weight, somewhat resembling in shape the pounds of butter in some parts of the west of England.

Gloucester cheese. There are two varieties of this cheese: *the single,* made of milk deprived of part of its cream, and *the double,* made of milk retaining the whole of the cream. The best kind has a fine mild taste; a semi-buttery consistence, without being friable, and is made up into large round flattish forms.

Green or sage cheese is made from milk previously mixed with the juice or an infusion or decoction of sage leaves, to which some marygold flowers and parsley are frequently added.

Lincolnshire cheese is made of new milk and cream, and formed into pieces about 2 inches thick. It is very soft, and without great care, will not keep over two months. Some persons sprinkle dry salt over them, when they will keep better.

Norfolk cheese. This is remarkable for the curd being dyed yellow, with annotto or saffron. It is of very good but not superior quality, and usually weighs from ¼ to ½ cwt.

Neufchatel cheese. After Rochefort cheese, this is the best manufactured in France. It is made of cream, and seldom exceeds 5 or 6 oz. in weight.

Parmesan cheese. This is made at Parma, and in other parts of Lombardy. Its peculiar flavor is said to arise from the luxuriance of vegetation in that part of Italy, and from the great abundance of aromatic flowers in the pastures. It is more probable, however, that the application of heat to the curd of the milk, to harden it, as is the common practice in Lombardy, is the true cause of its flavor. The following method is said to produce a cheese equal to the best Parmesan:

"Let the day's milk be heated to the degree of 120° of Fahrenheit, then removed from the fire until all motion ceases, put in the rennet, allow an hour for the coagulation, after which set the curd on a slow fire until heated to 150°, during which the curd separates in small lumps. A few pinches of saffron are then thrown in, together with cold water sufficient to reduce it instantly to a bearable heat, when the curd is collected by passing a cloth beneath it, and gathering it up at the corners. Place the curd in a circle of wood without a bottom; lay it on a table covered by a round piece of wood, pressed down by a heavy stone. The cheese will acquire sufficient consistence in the course of a night to bear turning, when the upper side is to be rubbed with salt, and continued alternately for forty days."

"In Italy, the outer crust is next cut off, and the new surface varnished with linseed oil; but that may well be omitted, as well as coloring one side of it red."

Polish cheese. This is generally of very inferior quality, and made in imitation of English cheese.

Rochefort cheese. This is made of ewe's milk, and is the best kind prepared in France. It resembles Stilton, but is scarcely of equal richness or quality. By kneading the gluten of wheat with a little salt, and a small portion of a solution of starch, it acquires the taste, smell, and unctuosity of cheese; so that after it has been kept a certain time, it is not to be distinguished from the celebrated Rochefort cheese, of which it has all the pungency. (Roulle.) See the remarks on the Principles of Cheesemaking, above.

Russian cheese. This is generally of a very inferior kind. The best sort is that made in imitation of English cheese; the commoner kinds merely consist of salted curd, placed in a bag and wrung dry, by two persons twisting the ends in opposite directions. It is usually not only bad tasted, but dirty.

Slipcoat or soft cheese is a very rich white cheese, somewhat resembling butter, made for present use.

Stilton cheese, named after the town where it was originally made, is at once the richest and finest variety of cheese manufactured in England. It is prepared from raw milk, to which cream taken from other milk is added. Its shape is peculiar, being generally twice as high as it is broad. It is generally twice the price of Cheshire or dou-

ble Gloucester. Like wine, this cheese is vastly improved by age, and is therefore seldom eaten before it is two years old. A spurious appearance of age is sometimes given to it by placing it in a warm damp cellar, or by surrounding it with masses of fermenting straw, or rotten cow-dung.

Suffolk cheese is made from skimmed milk, and is usually shaped into round flat forms, weighing from 24 lbs. to 30 lbs. each. It much resembles the skimmed or "scald" milk cheese made in Devonshire.

Swiss cheese. The principal cheeses made in Switzerland are the Gruyère, or Jura, and the *Schabzieger*, or *green cheese*. The latter is flavored with melilot.

Wiltshire cheese resembles poor Cheshire or Glo'ster. The outside is generally covered with red paint, made by mixing up ruddle or red ochre with whey, and laying it in with a brush.

Yorkshire cheese is a fine variety of cream cheese, but will not keep.

Concluding Remarks. It is surprising that cheese is not more frequently made an article of domestic manufacture, especially by housewives resident in the country. The operations of cheese-making are all exceedingly simple, and not at all laborious, and will, in most cases, amply repay the outlay for the milk. With the peasantry, who can usually procure a few gallons of milk from the houses of the farmers for whom they work, it really appears a want of common foresight, not to provide themselves with a few pounds of this wholesome and nutritious article, which is looked upon by some of those roughly-fed children of the soil, as a luxury beyond their reach. In a family where cheese is generally relished by the majority of the members, it becomes quite as necessary to have home-made cheese as home-made bread, and there is scarcely a portion of the United Kingdom where milk may not be obtained, during the summer months, at such a price as to render it important in a pecuniary point of view. Besides, cheese is not unfrequently colored with stains and pigments which are injurious, and even poisonous. Several persons have nearly lost their lives, from eating cheese colored with annotto, for instance. This dye is commonly adulterated with red-lead, so that the farmer (cheesemaker) may very innocently introduce a dreadful poison, when he only intends to improve the color. By making our own cheeses, the liability to such an accident is avoided.

When a whole cheese is cut, and the consumption small, it is generally found to become unpleasantly dry, and to lose flavor before it is consumed. This is best prevented by cutting a sufficient quantity for a few days' consumption from the cheese, and placing the remainder in a cool place, rather damp than dry, spreading a thin film of butter over the cut surface, and covering it with a cloth to keep off the dirt. This removes the objection existing in small families against purchasing a whole cheese at a time. The common practice of buying small quantities of cheese should be avoided, as not only a higher price is paid for any given quality, but there is little likelihood of obtaining exactly the same flavor twice running. Should cheese become too dry to be agreeable, it may be used for stewing, or when grated cheese is wanted.

Toasted cheese is much relished by some persons, but is seldom met with well prepared. The following has been handed to the writer by the cook of a certain nobleman who prides himself on his gustful appetite. Cut the cheese into slices of moderate thickness, and put them into a tinned copper saucepan, with a little butter and cream, simmer very gently until quite dissolved, then remove it from the fire, allow it to cool a little, and add some yelk of egg, well beaten; make it into a shape, and brown it before the fire.

CHELTENHAM SALTS. *Prep.* Glauber salts 1 oz.; Epsom salts ¾ oz.; culinary salt a teaspoonful; sulphate of iron 2 grs.; reduce them separately to fine powder, then mix them.

II. Glauber salts and Epsom salts, of each 28 lbs.; common salt 7 lbs.; sulphate of iron 1¼ oz.; mix.

Remarks. The above salts must be dried in an oven, or over the fire, before reducing them to powder. The Glauber's should be dried by itself, as it liquefies when slightly heated. Cathartic and tonic. *Dose.* ½ oz. to 1½ oz.

CHELSEA PENSIONER. *Prep.* Gum guaiacum ¼ oz.; rhubarb ½ oz.; cream of tartar 2 oz.; flowers of sulphur 4 oz.; nutmegs 2 in number, (all in powder;) honey 1½ lb.; make them into a confection by beating them together in a mortar.

Remarks. The dose is two tablespoonfuls, night and morning, in rheumatism. The name is said to have been given to it from the circumstance of a Chelsea pensioner having cured Lord Amherst with it.

CHILBLAIN. An inflammatory swelling, of a purple or lead color, produced by the action of cold. Children, especially those of a scrofulous habit, and elderly persons, are generally most liable to chilblains. The common cause of chilblains is holding the hands or feet to the fire, after exposure to cold. The sudden change of temperature partially destroys the vitality, and prevents the proper flow of blood through the part. The best preventives of chilblains are woollen socks or stockings, good waterproof shoes, woollen gloves, exercise, and friction. *When chilblains have once formed*, the best treatment is friction, with stimulants, as spirits of wine and camphor, turpentine, opodeldoc, dilute spirits, camphorated oil, &c. Linnæus recommends bathing the part with dilute muriatic acid, just strong enough to faintly prick the skin. When the inflamed parts have ulcerated, they are commonly called *kibes*. In this state they should be dressed with a little resin cerate, or elemi ointment, and if fungous granulations appear, they must be removed by touching them with nitrate of silver or blue vitriol.

CHILBLAINS, LOTIONS FOR, (POPULAR.) I. Dissolve white copperas 1 oz. in water 1 pint, and occasionally apply it to the affected parts.

II. Dissolve sal ammoniac 1 oz. in vinegar ½ pint; as above.

III. Mix compound soap liniment 2 oz. with tincture of Spanish flies 1 oz.; as above.

IV. Vinegar and spirit of wine, (or rum,) of each ½ pint; sal ammoniac, in powder, 1 oz.; mix and shake until the latter dissolves.

V. Spirits of salts 1 oz.; water ½ pint; mix; as above.

CHILBLAINS, OINTMENT FOR. *Prep.* Ointment of nitrate of mercury 1 oz.; camphor 1 dr.; oil of turpentine 2 drs.; oil of olives 4 drs.; mix well together. To be applied, by gentle friction, 2 or 3 times daily.

II. Calomel and camphor, of each 1 dr.; spermaceti ointment 4 drs.; oil of turpentine 2 drs.; as last.

Remarks. All the preceding lotions and ointments are intended for chilblains before they break.

CHILBLAINS, RUSSIAN REMEDY FOR. A common remedy for chilblains among the peasants in Russia is the rind of perfectly ripe cucumbers, dried with the soft parts attached, and placed with the inner side, previously soaked in warm water, over the sore parts. Dumitriefsky confirms the efficacy of this remedy. (Med. Zeitung.)

CHIMNEYS ON FIRE may be readily extinguished in several ways, without having recourse to throwing water down them from the top, by which much damage is frequently done to the furniture in the rooms. One of the simplest methods is, to scatter a handful of flowers of sulphur over the dullest part of the burning coals, the mephitic vapors arising from which will not support combustion, and consequently extinguish the flames. *Another* method is, to shut the doors and windows, and to stop up the bottom of the chimney with a piece of wet carpet or blanket, throwing a little water or flowers of sulphur, or salt, on the fire immediately before doing so. By this means the draught is stopped, and the burning soot must be extinguished for want of air. If the chimney be stopped at top, instead of the bottom, the whole of the smoke must, of course, be driven into the apartment. If every fireplace were provided with a damper, or shutter of sheet-iron or tin plate, sufficiently large to choke it thoroughly, fires in chimneys would become of little consequence, as it would only be necessary to apply this damper to put them out.

CHINA, (CHOICE OF.) In purchasing china, glass, and earthenware, care should be taken to select those sets that in case of breakage can be readily matched. Peculiar or rare patterns should be avoided, for if any such be broken, it will generally be found very difficult and expensive, and frequently impossible, to replace them.

Cleaning. China (when very dirty) is best cleaned with finely-powdered fuller's earth and warm water, afterwards rinsing it well in clean water. A little clean soft soap may be added to the water instead of fuller's earth. The same plan is recommended for cleaning glass.

Packing. As there is considerable art in packing brittle hollow-ware, in such a way that it will stand exposure to the jolting, blows, and agitation of land-carriage, it is better, where it is of much value, or in quantity, to have it done by a person used to the job. A man, accustomed to packing such articles, may be readily procured at any glass-works, or china warehouse, for a trifling consideration.

CHINA-ROOT STARCH. A reddish-colored farina, procured from the smilax china.

CHINESE SHEET-LEAD. The Chinese employ large quantities of sheet-lead in packing their tea, which they make in the following way:—Melted lead is poured from a crucible upon a large flat stone, placed upon the ground, and immediately another stone is dashed upon the fluid lead, which is thus pressed out into a very thin plate or leaf. This is instantly removed, and the operation repeated as rapidly as possible. The rough edges of the plates are afterwards cut off, and then soldered together for use. The Chinese employ two men in this process; one to pour on the melted lead, and the other to work the stone. A similar method has been adopted for some years in England, to form the plates of zinc for galvanic batteries.

CHIRAYITINE, SULPHATE OF. The substance sold under this name is sulphate of quina. Chirayita yields no alkaloid, but merely a bitter matter.

CHLORAL. A substance prepared by the action of chlorine on alcohol.

Prep. Place anhydrous alcohol in a tubulated retort, and pass dry chlorine gas through it, at first in the cold, but afterwards with the application of a gentle heat. As soon as the chlorine passes undecomposed through the liquor at the boiling temperature, the process is complete. On cooling, the liquid in the retort solidifies, forming a crystalline mass of hydrated chloral. This must be melted by gentle heat, and agitated with thrice its volume of oil of vitriol, when, on increasing the heat a little, an oily stratum of impure chloral will rise to the surface. This must be removed, boiled for some time, to drive off some free hydrochloric acid and alcohol, and next distilled with an equal volume of oil of vitriol; lastly, it must be rectified from finely-powdered quicklime, stopping the process as soon as the surface of the lime becomes dry.

Remarks. The chlorine is best introduced by a tube inserted into the tubulature of the retort, and a long tube, bent upwards, should be connected with the beak to convey away the hydrochloric acid gas extricated, and to allow the volatilized alcohol and chloral to condense and flow back into the retort.

Prop. Chloral is an oily liquid, possessing an ethereal smell; it is soluble in alcohol, ether, and water, but its solution in the latter rapidly changes into a semi-solid crystalline mass of hydrate of chloral, soluble in a larger quantity of water. Chloral boils at 202°, and has a sp. gr. of 1·502.

CHLORATE. A compound of chloric acid with a base. The chlorates are very similar to the nitrates, both in their properties and composition. They are all decomposed at a red heat, metallic chlorides being formed, and oxygen gas given off. Like the nitrates, they deflagrate with inflammable substances, but with greater facility and violence. A mixture of this kind will detonate with a slight blow or friction. All the chlorates are soluble in water.

Tests. Rubbed with sulphur, or phosphorus, they explode violently; mixed with muriatic acid, and then with water, a liquid is formed, possessing bleaching properties. When heated, they evolve oxygen. Thrown on red-hot coals, they deflagrate like nitre. Sulphuric acid turns them orange red. The following simple method of testing the commercial chlorates has been proposed by M. Choron:

is added about 5% of perfectly tasteless rectified spirit of wine.

COFFEE FOR ICING. *Syn.* SHORBET AU CAFE. Cream for icing 1 quart; strong infusion of coffee a small teacupful; sugar 2 oz.; yelks of 4 eggs. Mix, and ice as wanted.

COFFEE FOR THE TABLE. To produce the beverage called coffee, in perfection, it is necessary to employ the best materials in its manufacture. The finest kind of coffee is that called mocha, and should be used when a very fine flavor is desired; but for common use, the better sorts of British plantation coffee may be employed. The berries should be carefully roasted by a gradual application of the heat, until the aroma be well developed, and the toughness destroyed. If too much heat be used, the volatile and aromatic properties of the coffee will be injured and the flavor inferior; while, on the other hand, if the berries be too little roasted, they will produce a beverage with a raw, green taste, very liable to induce sickness and vomiting. Properly roasted coffee should have a lively chocolate brown color, and should not have lost more than 18% of its weight by the process. If the loss exeeds 20% the flavor will be materially injured. As soon as roasted, the coffee should be placed in a very dry situation, the drier the better, and the sooner it is consumed the finer will be the flavor, as it powerfully absorbs a certain amount of moisture from the atmosphere by reason of its hygrometric power. This arises from the presence of a newly-discovered principle called assamar. (Reichenbach.) The berries should not be ground until a few minutes before being made into liquid coffee, for the same reason, and should more be reduced to powder at once than is wanted for immediate use, the surplus portion should be kept in a tin canister or glass bottle.

The shape or description of the coffee-pot appears of little consequence, though one furnished with a percolator or strainer, that will permit a moderately rapid filtration, is perhaps preferable. At least 1 oz. of coffee should be used to make 4 common sized coffee-cupfuls, and if wanted *strong*, this quantity should be doubled. The prevailing fault of the coffee made in England, arises from using too little of the powdered berry. The coffee-pot should be heated previously to putting in the coffee, which may be done by means of a little boiling water. The common practice of boiling coffee is quite unnecessary, for all its flavor and aroma is readily extracted by boiling hot water. Should it, however, be placed upon the fire, it should be only *just simmered for a minute*, as long or violent boiling injures it considerably. Hot water is capable of removing all the soluble aromatic portion of coffee, even at a temperature so low as 195° Fahr. I have often proved this by actual experiment with one of Beart's pneumatic filters, when a fluid, deliciously aromatic and sparkling, has been produced, and the grounds have only yielded a nauseous bitter flavor and faint color to fresh water, even when boiling hot.

When coffee is prepared in a common pot, the latter being first made hot, the boiling water should be poured over the powder, and not, as is commonly the plan, put in first. It should then be kept stirred for 4 or 5 minutes, when a cup should be poured out and returned again, and this operation repeated 3 or 4 times, after which, if allowed to repose for a few minutes, it will usually be fine.

Coffee is sometimes clarified, which is done by adding a shred of isinglass, a small piece of clean eel or sole-skin, or a spoonful of white of egg. An excellent plan, common in France, is to place the vessel containing the *made coffee* upon the hearth and to sprinkle over its surface a cupful of cold water, which from its greater gravity descends and carries the foulness with it. Another plan sometimes adopted is to wrap a cloth, previously dipped in cold water, round the coffee-pot. This method is commonly practised by the Arabians in the neighborhood of Yemen and Moka, and is said to rapidly clarify the liquor.

The Parisians, who are remarkable for the superior quality of their coffee, generally allow an ounce to each large coffee-cupful of water, and they use the coffee both newly ground and roasted. A shred of saffron, or a little vanilla, is frequently added. The coffee-pot called *à grecque the cafetière à la belloy, or coffee-biggin*, is commonly employed. This consists of a large coffee-pot, with an upper receptacle made to fit close into it, the bottom of which is perforated with small holes, and contains in its interior two moveable metal strainers, over the second of which the powder is placed, and immediately under the third; upon this upper strainer boiling water is poured until it bubbles up through the strainer; the cover of the machine is then shut close down, and it is placed near the fire; so soon as the water has drained through the coffee the operation is repeated, until the whole intended quantity be passed through. Thus the fragrance and flavor will be retained, with all the balsamic and stimulating powers, and in a few moments will be obtained—without the aid of hartshorn-shavings, isinglass, or whites of eggs—a perfectly transparent infusion of coffee. When the Parisian uses a common coffee-pot, he generally divides the water into 2 parts. The first portion he pours on boiling hot, and allows it to infuse for 4 or 5 minutes, he then pours this off as clear as possible, and boils the grounds for 2 or 3 minutes with the remaining half of the water. After the latter has deposited the sediment it is decanted, and mixed with the infusion. The object of this process is to obtain the whole of the strength, as well as the flavor. The infusion is conceived to contain the latter, and the decoction the former. This plan has been recommended, with some modifications, by Mr. Donovan, and more recently by Dr. Davidson, in L'Expérience.

COFFEE, MILK. Boil a dessert-spoonful of ground coffee in about a pint of milk, a quarter of an hour; then put into it a shaving or two of isinglass, and clear it; let it boil a few minutes, and set it on the side of the fire to fine. This is a very fine breakfast, and should be sweetened with real Lisbon sugar.

"Those of a spare habit, and disposed towards affections of the lungs, would do well to make this their breakfast."

COFFEE, SEARLE'S PATENT. This is prepared by evaporating skimmed milk mixed with one-fortieth part of sugar, at a low temperature, and, when nearly solid, adding a very concentrated essence of coffee, and continuing the evaporation

at a very low temperature, (in vacuo if possible,) until the mixture acquires the consistence of a sirup, paste, or candy. (The latter may be powdered.)

COFFEE, SUBSTITUTES FOR. These are numerous, but the principal are the following:

I. (*Rye coffee. Dillenius's ditto. Hunt's breakfast-powder.*) Rye, roasted along with a little butter, and ground to powder. A good substitute.

II. (*German coffee. Succory ditto. Chicory ditto.*) From succory, as above. *Used* either for or mixed with foreign coffee. The most common adulteration of the latter.

III. (*Rice coffee.*) From rice, as above. A good substitute.

IV. (*Currant coffee.*) From the seeds washed out of the cake left in making currant wine.

V. (*Gooseberry coffee.*) From gooseberry seeds, as the last.

VI. (*Holly coffee.*) From the berries.

VII. (*Egyptian coffee.*) From chickpeas.

VIII. (*Rosetta coffee.*) From fenugreek seeds moistened with lemon juice.

IX. (*Corsican coffee.*) From the seeds of the knee-holly.

X. (*Sassafras coffee.*) From the fruit or nut of the sassafras tree, or from the wood cut into chips. Very wholesome. Much recommended in skin diseases, &c.

XI. (*Raspings.*) The raspings of the crust of loaves, procured at the baker's. Equal to rye coffee.

XII. (*Beech-mast coffee.*) From beech-mast or nuts. Very wholesome.

XIII. (*Acorn coffee.*) From acorns, deprived of their shells, husked, dried, and roasted. A good substitute.

XIV. (*Beet-root coffee.*) From the yellow beet-root, sliced, dried in a kiln or oven, and ground with a little foreign coffee. A good substitute.

XV. (*Bean coffee.*) Horse-beans roasted along with a little honey or sugar. When removed from the fire, a small quantity of cassia-buds is frequently added, and the whole is stirred until cold. Said to be a good substitute.

XVI. (*Almond coffee.*) Rye or wheat roasted along with a few almonds. A very small quantity of cassia-buds improves it. A good substitute.

COINS, IMPRESSIONS FROM. A very easy and elegant way of taking the impressions of medals and coins, not generally known, is as follows: Melt a little isinglass glue with brandy, and pour it thinly over the medal, so as to cover its whole surface; let it remain on for a day or two, till it has thoroughly dried and hardened, and then take it off, when it will be fine, clear, and as hard as a piece of Muscovy glass, and will have a very elegant impression of the coin. It will also resist the effects of damp air, which occasions all other kinds of glue to soften and bend if not prepared in this way. (Shaw.) If the wrong side of the isinglass be breathed on, and gold-leaf applied, it will adhere, and be seen on the other side, producing a very pleasing effect. Isinglass glue, made with water alone, will do *nearly* as well as if brandy be used.

Remarks. Medals may also be copied by surrounding them with a hoop of paper, and pouring on them plaster of Paris (mixed with water to the consistence of cream) to the depth of about ¼ an inch. Melted wax, stearine, fusible metal, or any similar material, may be used in the same way. If it be desired to copy the metal in copper, a mould should be first formed in the above manner, and the metal deposited on its surface by the agency of electricity. (See ELECTROTYPE.)

COLCHICINE. *Syn.* COLCHICINA. COLCHIA. A peculiar principle discovered by Gieger and Hesse in the seeds of the colchicum autumnale, or common meadow saffron. It also exists in the cormi or bulbs.

Prep. Macerate the crushed seeds in boiling alcohol, add hydrate of magnesia to throw down the alkaloid, digest the precipitate in boiling alcohol, and filter. By cautious evaporation colchicine will be deposited. It may be purified by re-solution.

Prop., &c. Odorless; tastes bitter; forms salts with the acids. It is very poisonous. One-tenth of a grain, dissolved in spirit, killed a cat in 12 hours. It differs from veratrine in being soluble in water, crystalline, and the non-production of sneezing when applied to the nose. Strong oil of vitriol turns this alkaloid of a yellowish brown; nitric acid of a deep violet, passing into indigo blue, green, and yellow.

COLCHICUM, POWDER OF. I. (*Collier.*) Seeds of colchicum 2 grs.; rhubarb 6 grs.; magnesia 10 grs.; mix for 1 powder, to be taken every six hours in acute rheumatism, inflammatory gout, &c., washing it down with a glass of Seltzer water, during high febrile action only.

II. (*Collier.*) Seeds of colchicum 3 grs.; muriate of ammonia 5 grs.; for 1 powder. For checking a paroxysm of gout, but its use requires caution. "After all that has been said respecting colchicum in gout, and admitting that it rarely fails to allay pain and check a paroxysm, I would record my opinion that he who would wish to arrive at a good old age, should eschew it as an ordinary remedy, and consider that he is drawing on his constitution for a temporary relief, with a certainty of becoming prematurely bankrupt in his vital energies."

COINDET'S PILLS. *Prep.* Protiodide of mercury 1 gr.; extract of liquorice 20 grs.; mix, and divide into 8 pills. *Dose.* 2 to 4 twice or thrice daily, as an alterative in scrofulous tumors, ulcers, &c.

COLD. When the body of an animal is immersed in an atmosphere at a temperature below the healthy standard, a sensation of coldness is experienced, produced by the passage of the caloric or heat of the body into the colder medium. If this withdrawal of caloric exceed the quantity produced by the vital system, the temperature of the body decreases, until it sinks below the point at which the functions of life can be performed. This declination is gradual; the extreme sensation of coldness changes into a disinclination for voluntary motion; next comes on drowsiness, followed by numbness and insensibility. In this state, if the sufferer be not rescued, and remedial measures had recourse to, death must rapidly follow.

Prevention of the effects of excessive cold.—The extremities of the body first suffer from the action of cold, owing to the circulation of the blood being less vigorous in those parts; they should,

therefore, be properly protected from its action. Woollen stockings or socks, with good shoes or boots, should be worn on the feet, and the body should be clad in thick woollen fabrics, proportioned to the inclemency of the weather, and the habits of the wearer. The circulation of the blood should be promoted by active exercise, and any disposition to sleep shaken off by increased bodily exertion. If the situation be such that exercise cannot be had recourse to, drowsiness is more likely to be experienced, and must be warded off, if possible, by keeping the mind incessantly and actively engaged. The principal endeavor should be to keep the extremities warm, as, if this be accomplished, no danger need be feared. In travelling by coach or on horseback, recourse may be had to hay and straw, which may be thrown over the feet and legs, and will materially ward off the effects of the weather.

Remedial measures for asphyxia produced by intense cold.—The patient should be laid in a room remote from the fire, and bathed with cold salt and water, after which the body should be wiped dry, and friction applied by the hands of the attendants, (warmed;) as many operating at once as can conveniently do so. Gentle stimulants should be administered by the mouth, and the bowels excited by some mild stimulating clyster. The lungs should also be inflated. (See ASPHYXIA.) As soon as symptoms of returning animation are evinced, and the breathing and circulation restored, the patient should be laid in a bed between blankets, and a little wine and water administered, and perspiration promoted by heaping an ample quantity of clothing on the bed. Should the patient have suffered from hunger as well as cold, the appetite may be appeased by the administration of a limited quantity of light food, taking especial care to avoid excess, or any thing indigestible or exciting.

COLIC. (From κωλον, the colon, the supposed seat of the disease.) The colic or bellyache. This name is commonly given to all severe griping abdominal pains, whatever may be the cause. This disease has been distinguished by nosologists into several varieties, as follows:—

I. (*The spasmodic colic.*) This kind is marked by a fluctuating pain about the navel, which goes away and returns by starts, often leaving the patient for some time. The belly is usually soft, and the intestines may often be felt in lumps, which move about under the hand, or wholly vanish for a time. It is unaccompanied by flatulency. *The remedies* are, warm fomentations, warm clysters, and carminatives, accompanied by small doses of camphor and opium.

II. (*The stercoraceous colic.*) This is marked by severe griping pains and constipation of the bowels. *The remedies* are powerful cathartics, as full doses of calomel, aloes, colocynth, jalap, &c., followed by purgative salts, as sulphate of magnesia or soda.

III. (*Bilious colic.*) In this variety the pain is intermittent and transient, accompanied by constipation, nausea, and vomiting. The fæces, if any, are bilious, dark-colored, and offensive. *The remedies* are, a full dose of blue pill, calomel, colocynth, or aloes, followed by a sufficient quantity of epsom or glauber salts. Warm fomentations are also serviceable.

IV. (*Flatulent colic.*) Marked by constipation and the irregular distension of the bowels by gas accompanied by a rumbling noise, &c. It is commonly produced by the use of flatulent vegetables and slops. *The remedies* are, a full dose of tincture of rhubarb combined with a few drops of essence of peppermint. If this does not afford relief, a pill made of 3 grs. of blue pill and 2 grs. of compound extract of colocynth, may be taken, washed down with a glass of any cordial water, as peppermint, cinnamon, or caraway. If the pain be extreme, warm fomentations to the belly, or a carminative clyster may be adopted.

V. (*Accidental colic.*) Produced by improper food and poisons. The treatment differs but little from the last variety.

VI. (*Colica pictonum. Devonshire colic. Plumber's do. Painter's do. Lead do.*) The dry bellyache. This species of colic is marked by obstinate costiveness, acrid bilious vomitings, violent pains about the region of the navel, convulsive spasms in the intestines, and a tendency to paralysis in the extremities. It is most prevalent in the cider counties, and among persons exposed to the fumes of lead. *The remedies* are the same as for the spasmodic variety. Should these fail, after the bowels have been thoroughly evacuated, small doses of camphor and opium may be administered. Mr. Benson, the managing director of the British Whitelead Works at Birmingham, strongly recommends the use of sulphuric acid; he says: "I met with a statement some time since that sulphuric lemonade has been successfully used at a white lead manufactory in France as a preventive of the injurious effects of white lead; and it occurred to me that by adding *sulphuric acid* to the treacle-beer then used by our people, its supposed efficacy might be tested. This idea was carried into effect in the summer of 1841, and the results have proved most gratifying, as, although during several weeks after the addition of the sulphuric acid to the treacle beverage, little advantage seemed to be derived, yet the cases of lead colic became gradually less frequent, and since October of that year, or during a period of fifteen months, not a single case of lead colic has occurred among the people." (Lancet.)

The following is Mr. Benson's form for his treacle or sulphuric beer:—Take of treacle 15 lbs.; bruised ginger ½ lb.; water 12 gallons; yeast 1 quart; bicarbonate of soda 1½ oz.; sulphuric acid (oil of vitriol) 1½ oz. by weight: boil the ginger in 2 gallons of water; add the treacle and the remainder of the water, hot; when nearly cold transfer it to a cask, and add the yeast to cause fermentation; when this has nearly ceased, add the sulphuric acid, previously diluted with eight times its quantity of water, and then add the bicarbonate of soda, dissolved in one quart of water. Close up the cask, and in three or four days the beer will be fit for use. As acetous fermentation speedily takes place, particularly in hot weather, new supplies should be prepared as required.

COLOCYNTHINE. *Syn.* COLOCYNTHITE. COLOCYNTHIUM. The purgative bitter principle of the colocynth.

Prep. Digest the aqueous extract or the pulp of colocynth in alcohol, filter and evaporate the tincture. The residuum is colocynthine combined with acetate of potassa. By agitation with a *little*

water the latter is removed. It may be purified by re-solution in alcohol, and evaporation.

Prop. A yellowish brown translucent resinous substance, very soluble in alcohol, less so in ether, and only slightly so in water. It is intensely bitter, and acts as a drastic purgative.

COLORING. *Syn.* Brewer's Coloring, Brandy do. Spirit do. Essentia Bina. Caramel. *Prep.* Melt brown sugar in an iron vessel over the fire, until it grows black and bitter, stirring it well all the time, then make it into a sirup with water.

Remarks. Some use lime-water to dissolve the burnt sugar. Care must be taken not to overburn it, as a greater quantity is thereby rendered insoluble. The heat should not exceed 430°, nor be less than 400°. The process for nice experiments is best conducted in a bath of melted tin, to which a little bismuth has been added to reduce its melting point to about 435°; a little powdered resin or charcoal, or a little oil being put upon the surface of the metal to prevent oxidizement.

COLORS, COMPOUND. (In Dyeing.) The mixture of blue and yellow dyes produces *green;* red and blue, *violet, purple, lilacs, &c.;* red and yellow, *orange, cinnamon, &c.;* red, yellow, and blue, *olives;* red and blues, or green or black, *browns* of all shades; black mixed with other dyes produces various shades of *brown* and olive, and when pale it constitutes *gray*, either by itself or the addition of a faint blue.

COLOMBIUM. A rare metal, discovered by Mr. Hatchet in 1801, in a black mineral belonging to the British Museum. Supposed to have been brought from America, hence the name. (See Tantalum.)

COLUMBIC ACID. The preceding metal exists in its ores in the form of an acid, united to iron, manganese, or yttria. From these it may be obtained by fusion with 3 or 4 parts of potash, solution in water, and precipitation with an acid. It falls as a white powder or hydrate.

CONCENTRATION. (In Chemistry.) The volatilization of part of a liquid in order to increase the strength of the remainder. The operation can only be performed on solutions of substances of greater fixity than the menstrua in which they are dissolved. Many of the liquid acids, solutions of the alkalis, &c., are concentrated by distilling off their water.

(In Pharmacy.) The term "concentrated" is very commonly applied to any liquid preparation possessing more than the usual strength. Thus we have "*concentrated*" *infusions, decoctions, liquors, solutions, tinctures*, and *essences*, most of which are made of 8 times the common strength. This is generally effected by using 8 times the usual quantity of the ingredients, with a given portion of the menstruum, and operating by digestion or percolation; the latter being generally adopted when the articles are bulky. When the menstruum is water, a little spirit is added to make the product keep.

CONCRETE. (In Architecture.) A compact mass, composed of pebbles, lime, and sand, employed in the foundations of buildings. The best proportions are 60 parts of coarse pebbles, 25 of rough sand, and 15 of lime.

CONDIMENTS. Substances taken with the food, to improve its flavor, or to render it more wholesome or digestible. The principal condiments are common salt, vinegar, lemon juice, spices, aromatic herbs, oil, butter, sugar, honey, and sauces. Most of these, in moderation, promote the appetite and digestion, but their excessive use tends to injure the stomach, and vitiate the gastric juice.

CONFECTIONS. (In Pharmacy.) Medicines, usually pulverulent, mixed up to the consistence of a paste with powdered sugar, sirup, or honey. In the "London Pharmacopœia," both conserves and electuaries are included under this head, though there appears to be some little distinction between them. As remedial agents, the officinal confections possess but little value, and are chiefly useful as vehicles for the administration of more active medicines. In making confections, the sugar requires the same attention as for sirups They should be kept in stone jars, covered with writing paper, and placed in a cool and dry situation. Without this precaution, they are apt to mould on the top. All the dry ingredients employed in making confections should be reduced to a very fine powder, and passed through a sieve not coarser than 80 holes to the inch.

CONFECTION OF ALMONDS. *Prep.* (*Confectio Amygdalæ*, P. L.) Sweet almonds ℥viii; white sugar ℥iv; powdered gum arabic ℥j. Macerate the almonds in *cold* water, then remove the skins, and beat them with the other ingredients until reduced to a smooth confection.

Use. To prepare milk of almonds. A little of this paste or powder, triturated with a sufficient portion of water, and strained through a piece of calico, forms emulsion of almonds.

CONFECTION OF ALKERMES. *Prep.* White sugar 1 lb.; rose-water ¼ pint; clarified juice of alkermes 3 lbs.; oil cinnamon 10 or 12 drops. Mix. It was formerly a common practice to add a little gold-leaf, rubbed small, so as to float about in it; also musk and ambergris.

CONFECTION OF ALUM. *Prep.* (*Conf. Aluminis*, St. B. H.) Alum in fine powder, 80 grs.; conserve of roses, enough to mix. *Use.* As an astringent.

CONFECTION, AROMATIC. *Syn.* Sir Walter Raleigh's Cordial. Confectio Raleighana, (P. L. 1720.) Ditto Cardiaca, (P. L. 1745.) Ditto Aromatica, (P. L. 1788, and since.) *Prep.* I. (P. L.) Nutmegs, cinnamon, and hay saffron, of each ℥ij; cloves ℥j; cardamoms ℥ss; prepared chalk ℥xvj; white sugar lbs. ij. Reduce the whole to a very fine powder, and keep it in a closed vessel. When wanted for use, mix it with water to the consistence of a confection.

Remarks. On the large scale the above form is seldom adhered to. Less saffron is commonly used, cassia is substituted for cinnamon, and, generally, the essential oil for the powder of cloves. Should there be any deficiency of color, this is brought up by a little tincture or infusion of turmeric. When a very smooth and fine powder is desired, it should be passed through a gauze sieve, not coarser than 80 holes to the inch, and precipitated chalk should be employed. The saffron should be dried with as little heat as possible, and care should be taken not to waste any in powdering. The following formula, which is employed by a large whole-

sale druggist in the city, produces an excellent article.

II. Hay saffron, cassia, and turmeric, of each 4 oz.; cardamoms 1 oz.; starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oil of nutmegs 2 drachms; oil of cloves 3 drachms. Reduce the dry ingredients to fine powder, and pass it through an 80 hole sieve, then add the oils, and after well mixing, pass it through a coarse sieve, (about 40 holes to the inch,) to ensure the whole being perfectly mixed.

The following form produces a powder possessing great depth and brilliancy of color.

III. Hay saffron 4 oz.; turmeric 3 oz.; powdered starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oils of cloves and cassia, of each 3 drachms; oil of nutmegs 2 drachms; essence of cardamoms 1 oz. *Proc.* Boil the saffron and turmeric in 1 gallon of water, placed in a bright copper pan, for 10 minutes, then, without straining, add the chalk, starch, and sugar; mix well, and continue stirring until the mixture becomes quite stiff, then break it up and dry it until fit for powdering. This must be performed in a water or steam bath. To the powder, passed through a fine sieve, as before, the oils and tincture must be added, and after being well mixed, and passed through a coarse sieve, it should be placed in a jar or bottle, and bunged up close.

Remarks. In the wholesale trade this article is kept under two forms: one in powder, as ordered by the College, and commonly called, for distinction sake, "*pulvis confectionis aromaticæ;*" the other mixed up ready for use. In preparing the latter, it is a common plan to make a strong infusion or decoction of the saffron, and to use it to mix up the other ingredients. Some persons follow the method described in the last formula, mixing up the powder to a proper consistence with water before adding the aromatics. When the price of *precipitated* chalk is an objection to its use, *prepared* chalk may be used instead. This confection is cordial, stimulant, and antacid. *Dose.* 10 to 60 grs.

CONFECTION OF BLACK PEPPER. *Syn.* Ward's Paste. *Prep.* (*Confectio Piperis Nigri*, P. L.) Black pepper and elecampane root, of each lb. j; fennel seed lb. iij; honey and white sugar, of each lb. ij; mix.

Remarks. The common practice is to keep the dry ingredients ready mixed in a bottle, and only to add the honey as wanted. The proportions are 2 parts of the latter to 7 of the mixture. The *dose* is 1 to 2 drachms 2 or 3 times a-day, in piles, fistula, &c. It should be persevered in for 2, 3, or 4 months, (Sir B. Brodie;) and as it is apt to accumulate in the bowels, its use should be accompanied by mild aperients. (Pereira.)

CONFECTIONS OF CASSIA. *Syn.* Electuarium Cassiæ, (P. L. 1788.) *Prep.* (*Confectio Cassiæ*, P. L.) Fresh cassia pulp lb. ss.; manna ℥ij; tamarind pulp ℥j; sirup of roses f℥viij. Bruise the manna and dissolve it in the sirup, then add the pulps and evaporate to a proper consistence.

CONFECTION OF HEMLOCK. (Dr. Osborne.) *Prep.* Fresh leaves of hemlock and moist sugar equal parts; beat them to a confection in a mortar.

CONFECTION OF OPIUM. *Syn.* Philonium Romanum, (P. L. 1720.) Ditto Londinense, (P. L. 1745.) Confectio Opiata, (P. L. 1788.) Ditto Opii, (P. L. 1809, and since.) *Prep.* (P. L.) Powdered opium ʒvj; long pepper ℥j; ginger ℥ij; caraways ℥iij; tragacanth ʒij; all in fine powder; sirup f℥xvj. Mix.

Use and Dose. This confection is intended as a substitute for the *mithridate* and *theriaca* of the old Pharmacopœia. It is stimulant and narcotic, and is given in flatulent colic and diarrhœa unaccompanied by fever. The dose is from 15 to 50 grs.

CONFECTION OF ORANGE PEEL. *Syn.* Conserva flavedinis Corticum Aurantiorum, (P. L. 1720 and 1745.) Ditto Corticis exterioris Aurantii Hispalensis, (P. L. 1788.) Ditto Aurantiorum, (P. L. 1824.) Ditto Aurantii, (P. L. 1809 and 1836.) *Prep.* (P. L.) The external rind of the fresh orange, separated by rasping, lb. j; white sugar lb. iij. Beat the rind in a stone mortar with a wooden pestle, then add the powdered sugar, and beat the mixture until the two are perfectly incorporated.

Remarks. This confection is tonic and stomachic, and is principally used as a vehicle for the exhibition of tonic powders.

CONFECTION OF PEPPERMINT. *Prep.* Green peppermint 4 oz.; powdered white sugar 12 oz.; beat them together as last.

Use. Anti-emetic and flatulent. Given in colic, &c., in the form of a bolus, or made into a mixture.

CONFECTION OF THE DOG ROSE. *Syn.* Confection of Hips. Conserva Fructus cynosbati, (P. L. 1720 and 1745.) Ditto Cynosbati, (P. L. 1788.) Ditto Rosæ Caninæ, (P. L. 1809, and since.) *Prep.* (P. L.) Pulp of the dog rose lb. j; powdered refined sugar ℥xx; mix by a gentle heat in an earthen vessel.

II. Pulped hips 2 cwt.; fine white sugar 2½ cwt.; incorporate them without applying heat.

Remarks. Both this and the following confection has a brighter color, if made without heat, or touching metallic vessels. On the small scale it is made by beating the ingredients together in a marble mortar, but in large quantities by grinding in a mill. It is slightly laxative, and is principally used for forming pills. It candies by keeping.

CONFECTION OF THE RED ROSE. *Syn.* Conserva Rosarum Rubrarum, (P. L. 1745.) Ditto Rosæ, (P. L. 1788.) Ditto Rosæ Gallicæ, (P. L. 1809 and 1824.) Confectio Rosæ Gallicæ, (P. L. 1836.) *Prep.* (P. L.) Petals of the red rose lb. j; refined sugar lb. iij; beat the petals in a stone mortar, then add the sugar, and again beat until thoroughly incorporated.

Remarks. On the large scale this is prepared like the confection of hips. It is astringent and tonic, and principally used for forming pills. If taken alone, the dose is 1 to 2 drachms.

CONFECTION OF RUE. *Syn.* Electuarium e Boccis Lauri, (P. L. 1720, 1745.) Confectio Rutæ, (P. L. 1809, and since.) *Prep.* (P. L.) Dried rue, caraway, and laurel berries, of each ℥iss; sagapenum (true) ℥ss; black pepper ʒij; honey ℥xvj. Reduce the dry ingredients to very fine powder, and when wanted for use, make them into a confection with the honey.

Use, &c. It is antispasmodic; in enemas 30 to

60 grs., with half a pint of gruel, for flatulent colic, &c.

CONFECTION OF SCAMMONY. *Syn.* ELECTUARIUM CARYOCOSTINUM, (P. L. 1720.) DITTO E SCAMMONIO, (P L. 1745.) DITTO SCAMMONII, (P. L. 1809 and 1788.) CONFECTIO SCAMMONEÆ, (P. L. 1809 and 1824.) *Prep.* (*Confectio Scammonii* P. L.) Scammony ℥iss; cloves and ginger, of each, ʒvj; oil of caraway f℈ss. Reduce the ingredients to a very fine powder, and when wanted for use, make them into a confection with sirup of roses, and lastly add the oil.

Use, &c. Cathartic in doses of 10 to 30 grs.

CONFECTION OF SENNA. *Syn.* LENITIVE ELECTUARY. ELECTUARIUM SENNÆ, (P. L. 1788.) CONFECTIO SENNA, (P. L. 1809, and since.) *Prep.* (P. L.) Senna ℥viij; figs lb. j; pulp of tamarinds, prunes, and cassia, of each, lb. ss.; coriander seeds ℥iv; liquorice ℥iij; sugar lb. iiss; water 3 pints. *Proc.* Rub the senna and corianders in a mortar, and separate by sifting ℥x of the mixed powders. Boil the figs and liquorice in the water, until reduced to one half; then press and strain the liquor. Evaporate the strained liquor until only 24 fluid ounces remain, then add the sugar, and when dissolved, mix in the pulps, and lastly the powder.

Use, Dose, &c. Confection of senna is a gentle and pleasant purgative, and well adapted for persons suffering from piles, and as a laxative during pregnancy. The dose is ¼ to ½ oz. taken at bedtime or early in the morning.

Remarks. Perhaps there is no one pharmacopœial preparation which it is more difficult to obtain of good quality than the above. The absolute cost of an article prepared according to the directions of the College, will be somewhere about 1*s.* 9*d.* per lb.; but there are many wholesale drug houses vending confection of senna, which they warrant as genuine, at from 9*d.* to 1*s.* a pound. Dr. Paris (in his Pharmacologia) very truly remarks, that "the directions of the Pharmacopœia are very rarely followed." I understand that considerable quantities are manufactured, into which unsound and spoiled apples enter as a principal ingredient. The following forms are, to my knowledge, employed by some members of the trade.

II. Powdered senna, pulp of tamarinds, cassia, and prunes, of each, 1½ lb.; powdered corianders ¾ lb.; Spanish juice ½ lb.; simple sirup 12 lbs.

III. As the above, omitting the cassia pulp, and adding 2 lbs. more tamarind pulp.

Both these articles are labelled P. L., and sent out as genuine, and that when no competition as to price exists. The cheaper article is made as follows:

IV. Common prunes and tamarinds, of each, 16 lbs.; treacle ¾ cwt.; species (a compound of senna dust and small senna, mixed with 3 lbs. of coriander seeds, and strengthened with jalap, all ground to a fine powder) 18¾ lbs. To this is frequently added ¼ cwt. of rotten or inferior apples, which are pulped with the prunes and tamarinds. This article is not unfrequently labelled "CONF. SENNÆ VER." by the conscientious tradesman.

CONFECTION OF SULPHUR, (COMPOUND.) *Prep.* (St. B. H.) Precipitated sulphur ℥ss; cream of tartar ʒj; honey ℥j; mix As a laxative in piles, &c. *Dose.* ℥ss.

CONFECTION OF STEEL. *Syn.* CONFECTION OF CARBONATE OF IRON. *Prep.* Confection of orange-peel and sesquioxide of iron, (P. L.,) of each, 4 oz.; powdered white sugar 6 oz.; simple sirup 2 oz.; mix. Aromatic and tonic. *Dose.* A teaspoonful to ½ oz. twice or thrice daily.

CONGELATION, (from *congelo*, to freeze.) IN CHEMISTRY. The conversion of a liquid into a solid state, by the action of cold.

The production of an extreme degree of cold is often of the utmost importance in chemical operations, and an easy method of doing so is consequently a desideratum. The means hitherto adopted for this purpose have either depended upon the sudden liquefaction of solids, or the abstraction of heat by rapid evaporation. The loss of sensible heat, by the first method, is the basis of the various processes of producing cold by what are commonly called freezing mixtures, all of which act upon the principle of liquefying solid substances without supplying heat. The caloric of liquidity being in these cases derived from that previously existing in the solid itself in a sensible state, the temperature must necessarily fall. The degree of cold produced, depends upon the quantity of heat which is thus diffused through a larger mass, or which, as it were, disappears, and this is dependent on the quantity of solid matter liquefied, and the rapidity of the liquefaction. Saline compounds are the substances most frequently employed, and those which have the greatest affinity for water, and thus liquefy the most rapidly, produce the greatest degree of cold. Thus it is, that chloride of calcium and nitrate of ammonia, when dry and in fine powder, if suddenly mixed with water, produce extreme cold. The latter, suddenly mixed with an equal weight of water at 50°, will sink the thermometer to +4°, or 28° below the freezing point. The most common and convenient freezing mixture, when snow can be procured, is formed by mixing 2 parts of that substance with 1 part of sea-salt. This will sink the thermometer to —5°, or 37° below the freezing point of water. Equal parts of these substances produce a degree of cold marked by the zero of Fahrenheit's thermometer, and is the standard taken for graduating that instrument. Mr. Walker, a gentleman who fully investigated this subject, recommends the following proportions for the production of extreme cold.

PEAU. BEZETTA CŒRULEA. *Prep.* I. Color pieces of clean linen with auvergne or ground archel, (lichen parellus.)

II. Dip pieces of clean linen into the juice of mulberries, blood-red grapes, lees of red wine, &c.

Use. To color jellies and confectionary, and the rind of cheeses.

CLARIFICATION. This word (from *clarus*, clear, and *facio*, I make) means, properly, any process of freeing a fluid from heterogeneous matter, and thus includes filtration. In its commoner sense, however, it is applied to the process of clearing liquids by the addition of some substance that either inviscates the feculous matter, and subsides with it to the bottom, or, that induces such a change in its nature or bulk, that it subsides by its own density, in each case leaving the liquor transparent. Albanum, gelatin, acids, certain salts, blood, lime, plaster of Paris, alum, heat, alcohol, &c., serve in many cases for this purpose. The first is used under the form of white of egg, for the clarification of sirups, as it combines with the liquid when cold, but on the application of heat, rapidly coagulates and rises to the surface, carrying the impurities with it, forming a scum which is easily removed with a skimmer. It is also much used for fining wines and liqueurs, particularly the red wines and more limpid cordials. Gelatin, under the form of isinglass, dissolved in water, or weak vinegar, is used to fine white wines, beer, cider, and similar liquors, that contain a sufficient quantity of either spirit or astringency (tannin) to induce its precipitation. Sulphuric acid is frequently added to weak liquors for a similar purpose, either alone, or after the addition of white of egg, or gelatin, both of which it rapidly throws down in an insoluble form. A pernicious practice exists among some unprincipled parties, of using certain salts of lead and potash to clear their liquors, especially those that are expected to sparkle in the glass, as cordial, gin, &c. For this purpose, a little sugar of lead, dissolved in water, is first mixed up with the fluid, and afterwards about half its weight of sulphate of potash, also dissolved in water, is added, and the liquor is again roused up. By standing, the sulphate of lead, formed by this mixture, subsides, and leaves the liquor clear. Blood is used in the same way as isinglass or white of eggs, for fining red wines, beer, and porter. Lime, alum, alcohol, and heat, act by curdling or coagulating the feculencies, and thus, by increasing their density, induce their subsidence. Plaster of Paris acts partly like the above, and partly like albumine, or gelatin, by enveloping and forcing down the suspended matter. Sand is often sifted over liquors for the simple purpose of acting by its gravity, but appears to be quite useless. The juices of plants are clarified by heat, which coagulates the albumine they contain. Marl, or clay, is frequently used to clear cider and perry. A strip of isinglass is generally employed to clarify coffee. (See WINES, BREWING, CORDIAL, COFFEE, INFUSION.)

CLEANING. The best way to clean a house is to *keep it clean* by a daily attention to small things, and not allow it to get into such a state of dirtiness and disorder as to require great and periodical cleanings. Some mistresses, and also some servants, seem to have an idea that a house should undergo "regular cleanings," or great washing and scrubbing matches once every three or six months, on which occasions the house is turned almost inside out, and made most uncomfortable. All this is bad economy, and indicates general slovenliness of habits. (Chambers.)

CLEAR-STARCHING. This is practised as follows: "Rinse the articles in three waters, dry them, and dip them in a thick starch, previously strained through muslin; squeeze them, shake them gently, and again hang them up to dry; and when dry, dip them twice or thrice in clear water, squeeze them, spread them on a linen cloth, roll them up in it, and let them lie an hour before ironing them. Some persons put sugar into the starch to prevent it sticking while ironing, and others stir the starch with a candle to effect the same end; we object to these practices as injurious to the article starched, or as very nauseous. The best plan to prevent sticking is to make the starch well, and to have the irons quite clean and highly polished."

CLOTH, CLEANING AND SCOURING OF. The common method of cleaning cloth is by beating and brushing, unless when very dirty, when it undergoes the operation of scouring. This is best done on the small scale, as for articles of wearing apparel, &c., by dissolving a little curd soap in water, and, after mixing it with a little ox-gall, to touch over all the spots of grease, dirt, &c., with it, and to rub them well with a stiff brush until they are removed, after which the article may be well rubbed all over with a brush or sponge dipped into some warm water, to which the previous mixture and a little more ox-gall has been added. When this has been properly done, it only remains to thoroughly rinse the article in clean water until the latter passes off uncolored, when it must be hung up to dry. For dark-colored cloths the common practice is to add some fuller's earth to the mixture of soap and gall. When *nearly* dry, the nap should be laid right, and the article carefully pressed, after which a brush, moistened with a drop or two of olive oil, should be several times passed over it, which will give it a superior finish. Cloth may also be cleaned in the dry way as follows:—First, remove the spots as above, and, when the parts have dried, strew clean damp sand over it, and beat it in with a brush, after which brush the article with a hard brush, when the sand will readily come out, and bring the dirt with it. *Black cloth* which is very rusty, should receive a coat of reviver after drying, and be hung up until the next day, when it may be pressed and finished off as before. *Scarlet cloth* requires considerable caution. After being thoroughly rinsed, it should be repeatedly passed through cold spring water, to which a tablespoonful or two of solution of tin has been added. If much faded, it should be dipped in a scarlet dye-bath. *Buff cloth* is generally cleaned by covering it with a paste made with pipe-clay and water, which, when dry, is rubbed and brushed off.

Fruit spots and similar stains may frequently be removed by holding the part over a common brimstone match, lighted, or by water acidulated with a little salt of lemons, oxalic or muriatic acid; but care must be taken not to apply this liquid to colors that it will injure.

The stains of acids may be removed by washing the part with a little spirits of hartshorn or

liquid ammonia; *those of alkalis*, by water acidulated with lemon juice or tartaric acid.

Grease spots may generally be taken out by means of a little soft soap; or, if the color be delicate, or a false dye, a little ox-gall or curd soap will be better. These must be used as above described. *Stains of painters' oils, wax, paints, or varnishes*, will not usually yield to the above plan; in these cases, a simple way is to soak the part in spirits of turpentine, and, when softened, to wash it off with the same fluid. Ether or essential oil of lemons will also quickly remove these spots, but is too expensive for general use.

CLOTH, INCOMBUSTIBLE. This is made of fibres of asbestos by weaving. It will bear a considerable heat without injury. Cotton and linen fabrics prepared with a solution of sal ammoniac, or phosphate of ammonia, may be placed in contact with ignited bodies without danger. They will carbonize, but not inflame. Solutions of alum, sea salt, &c., have been used for the same purpose. It is by a knowledge of this property of culinary salt, that jugglers are enabled to perform the common trick of burning a thread of cotton while supporting a ring or a key, without the latter falling to the ground. The cotton is reduced to a cinder, but, from the action of the salt, its fibres still retain sufficient tenacity to support a light weight.

CLOTH, RENOVATION OF. The article undergoes the process of scouring before described, and, after being well rinsed and drained, it is put on a board, and the threadbare parts rubbed with a half-worn hatter's card, filled with flocks, or with a teazle or a prickly thistle, until a nap is raised. It is next hung up to dry, the nap laid the right way with a hard brush, and finished as before. When the cloth is much faded, it is usual to give it a "dip," as it is called, or to pass it through a dye-bath, to freshen up the color.

CLOTHES, BRUSHING AND PRESERVATION OF. If very dusty, hang them on a horse or line, and beat them with a cane; then lay them on a clean board or table, and well brush them, first with a stiff brush, to remove the spots of mud and the coarsest of the dirt, and next with a softer one, to remove the dust and to lay the nap properly. If clothes be wet and spotted with dirt, dry them before brushing, and then rub out the spots with the hands. The hard brush should be used as little as possible, and then with a light hand, as it will, if roughly and constantly employed, soon render the cloth threadbare. Should there be spots of tallow-grease on the clothes, take it off with the nail, or, if that cannot be done, have a hot iron with some thick brown paper, lay the paper on the part where the grease is, then put the iron upon the spot; if the grease comes through the paper, put on another piece, till it ceases to soil it.

After the clothes are brushed, they should be hung up in a clean place, free from dust, if wanted for immediate use; but if intended to remain unused for some time, they should be placed away on the shelves of the clothes' closet or wardrobe. The latter should always be in the driest situation possible, as if the clothes be exposed to the least damp, they not only acquire an unpleasant smell, but gradually become rotten.

CLOVES. The flower buds of the eugenia caryophyllata, dried and smoked. It is a common practice to adulterate this spice in the same manner as cinchona bark. Cloves from which the oil has been distilled are dried and rubbed between the hands, previously moistened with a little sweet oil, to brighten their color, after which they are mixed up with fresh spice for sale.

COACH ACCIDENTS. "Should the horses run off, in defiance of all restraint, while you are in a coach, sit perfectly still, and in anticipation of the possible overturn, keep your legs and arms from straggling. Sit easily and compactly, so that, when upset, you will gently roll over in the direction you are thrown. We have seen ladies in these circumstances scream wildly, and throw their arms out of the windows, thus exposing themselves to the chance of broken limbs. If run away with in a gig, either sit still collectedly, or drop out at the back, so as to fall on your hands. Never jump from a rapidly-moving vehicle, unless (supposing it impossible to slip down behind) you see a precipice in front, in which case any risk of personal damage is preferable to remaining still. The Duke of Orleans lost his life by neglecting these simple precautions."

COAK. *Syn.* COKE. CHARRED COAL. MINERAL CHARCOAL. Carbonized coal. The principle of its manufacture is similar to that of charcoal. There are three varieties of coak, viz.

I. (*Kiln-made coak. Stifled coak.*) Made by burning the coal in a pile, kiln, or stove. It has a dull black color, and produces an intense heat when used as fuel. The coal is frequently burnt in a series of shallow stoves, with as little access of air as will support the combustion, and the smoke conducted through proper horizontal tunnels to a capacious brick chamber, 100 yards or more in length, kept as cool as possible by a stream of water passing over its roof, or by a shallow pond resting on it. Here the bituminous vapors are condensed in the form of tar, along with a considerable quantity of crude ammoniacal salt. Common coal yields about 3$\frac{0}{0}$ of tar when treated in this way, but some strong bituminous coal will give $\frac{1}{7}$ or $\frac{1}{8}$ of its weight. This tar, when inspissated, gives 75$\frac{0}{0}$ of pitch, and 20 to 24$\frac{0}{0}$ of a crude species of naphtha, that is excellent for out-door painting. The ammonia is made into sal ammoniac. The *screenings*, or dust-coal, separated from the better kinds of bituminous coal, is the sort commonly used for making coak in ovens.

II. (*Gas coak. Distilled coak.*) The cinder left in the retorts after the gas has been distilled off. Its color is gray, and it only produces a weak heat in burning, not sufficient to smelt iron.

III. (*Slate coak. Carbon mineral.*) From bituminous slate, burned in covered iron pots, in a similar way to that adopted for making bone-black. Also burnt in piles. It is black and friable. Used to clarify liquids, but vastly inferior to bone-black, and does not abstract the lime from sirups.

COBALT. *Syn.* REGULUS OF COBALT. A metal discovered by Brandt, in 1733. It is found in ores, associated with arsenic and other metals, and is constantly present in meteoric iron.

Prep. Dissolve oxide of cobalt in muriatic acid, and pass sulphureted hydrogen gas through the solution, until all the arsenic is thrown down; filter and boil with a little nitric acid, then add an ex-

has been so long employed in this manufacture, I am at a loss to discover; for it must be obvious that chromate of soda would answer all the purposes of chromate of potassa, the base being of little consequence, so long as it forms a soluble salt with the chromic acid, as it is merely useful as a vehicle for the chromic acid." (C. Watt, jun.)

CHROME RED. *Syn.* Dichromate of Lead. Subchromate of ditto. Red Chromate of ditto. *Prep.* I. Boil carbonate of lead with chromate of potash, in excess, until it assumes a proper color; wash well with pure water and dry in the shade.

II. Boil neutral chromate of lead with a little water of ammonia or lime water.

III. (*Process of Liebig and Wohler.*) Fuse saltpetre at a low red heat in a crucible, and throw in chrome yellow, by small portions at a time, until the nitre be nearly exhausted. A strong ebullition takes place upon each addition of the pigment, and the mass becomes black and remains so while hot. After it has settled for a minute or two, the fluid part should be poured off, and the mass remaining in the crucible washed with water, and dried by a gentle heat.

Remarks. Great care must be taken in conducting the last process, not to employ too much heat, or to allow the saline matter to stand long over the newly-formed chrome-red, as the color is thus apt to change to a brown or orange. When well managed, the product has a crystalline texture, and so beautiful a red color, that it vies with cinnabar. It has been proposed as a pigment.

CHROME YELLOW. *Syn.* Chromate of Lead. Yellow Chromate of ditto. *Prep.* I. Add a filtered solution of nitrate or acetate of lead, to a like solution of neutral chromate of potash; collect the precipitate, wash it well, and dry it out of the reach of sulphureted vapors.

II. To the lye of chromate of potash, prepared by roasting the chrome ore with nitre, and lixiviation with water, add a solution of acetate of lead, and proceed as before.

Remarks. This substance is the beautiful pigment employed by painters. Four shades are usually met with in the shops, viz.: *Pale yellow* or straw color, *yellow*, *full yellow*, and *orange*. The former are made by adding a little alum or sulphuric acid to the solution of the chromate before mixing it with the solution of lead; the latter, by the addition of a little subacetate of lead. The darker color appears to arise from a little dichromate being thrown down intimately mixed with the neutral chromate, and the paler shades from a *slight* excess of acid. I found a little alumina in some samples of pale chrome yellow, which I lately examined, and in one instance a little sulphate of lead.

CHROMIC ACID. A compound of the metal chromium and oxygen.

Prep. I. *Pure* chromic acid may be prepared by transmitting the gaseous fluoride of chromium into water contained in a vessel of platinum or silver, and evaporating the liquid to dryness.

II. By conducting gaseous fluoride of chromium into a silver or platinum vessel, the sides of which are just moistened with water, and the aperture covered with a piece of moist paper, the acid will be deposited under the form of red acicular crystals, which will fill the vessel.

III. "The principle upon which this is based is, that nitrate of baryta, which results from the decomposition of the chromate of baryta by nitric acid, is quite insoluble in concentrated nitric acid, which I have verified by many experiments, and which fact was, I believe, first observed by Mr. Reuben Phillips.

"The chromic acid may be separated from the nitrate of baryta by decantation, or, which is still better, by filtration through asbestos. Care must be taken not to let it come in contact with any organic matter, or it will be decomposed.

"The chromic acid is then to be evaporated to dryness, when the nitric acid will be volatilized, leaving pure chromic acid.

"When the quantity of chromic acid prepared by this plan is considerable, to reduce the expense as much as possible, it will be as well to carry on the evaporation so that the superabundance of nitric acid which has been used may be condensed, which may again be used for the same purpose.

"The only precautions necessary to ensure the purity of the chromic acid prepared by this plan, are the following:—to use a sufficient quantity of nitric acid, and to take care that the nitric acid is sufficiently concentrated, and that it is pure, otherwise the impurities which it contains will remain in the chromic acid.

"The chromate of baryta may be easily prepared by mixing together solutions of the chloride of barium, and any of the soluble chromates; before it is used for the preparation of pure chromic acid, it should be washed several times." (Chemist, iii. 266.)

On the commercial scale, crude chromic is prepared by either of the following plans:

IV. To a saturated solution of 100 parts of chromate of potash in water, add 49 parts of sulphuric acid, (sp. gr. 1·845.) This is the common process, but the product contains sulphate of potash.

V. Digest chromate of baryta in an equivalent proportion of sulphuric acid, diluted with water; after a few hours decant the clear liquid.

VI. Digest chromate of lead in sulphuric acid in equivalent proportions.

Mr. Charles Watt, jun., recommends chromate of lime as a source of chromic acid. This salt he prepares from the oxide of chromium, contained in the residual liquor of the process of bleaching with chromic acid, and this he effects by a very inexpensive process. The chromic solution is placed in a wooden vessel, and slaked lime cautiously added until the sulphuric or muriatic acid present is saturated, carefully avoiding excess, as oxide of chrome would be then precipitated. After an hour's repose the clear portion is decanted, and finely-slaked lime added, until all the oxide is thrown down; which may be known by the liquor becoming clear when allowed to settle. During the addition of the lime, constant agitation must be employed. The oxide of chromium must now be allowed to settle, and after the liquid portion is decanted, washed with a few pailfuls of clean water. After the latter has drained off, the residual mixture of oxide of chromium and lime must then be placed about 2 inches thick upon a large flat iron plate, set evenly over a fire, and turned every half

hour until the process be completed, which may be known by the mass assuming a yellow color, instead of the grayish one it previously possessed. Care must be taken not to employ too much heat, as the product of this process (chromate of lime) is readily decomposed, and assumes a green color, in which case it is rendered useless. From the chromate of lime the acid is procured by the action of an equivalent proportion of sulphuric acid. This process has the great recommendation of cheapness, and Mr. Watt says that he has employed it in the factory of Messrs. Haws, for nearly two years, with *perfect success.*

Prop., Uses, &c. Pure chromic acid forms red crystals, and is soluble in water and alcohol. It is readily decomposed by the action of light and contact with organic matter. Hence it should be kept in stoppered glass bottles, and its solution filtered through asbestos. The ease with which it parts with a portion of its oxygen constitutes its value as a bleaching agent. It is largely employed in the arts, in calico-printing, bleaching of textile fabrics, tallow, oils, &c.

CHROMIUM, (from χρωμα, color.) A metal discovered by Vanquelin in 1797.

Prep. I. Mix dry chloride of chromium with oil, place the paste in a crucible lined with charcoal, lute on the cover, and expose it for an hour to an intense heat. (Vauquelin.)

II. Heat the compound of terchloride of chromium and ammonia to redness, and expose it to a current of dry ammoniacal gas. (Liebig.)

Remarks. The product of the first process has a whitish-yellow color, and a metallic lustre; that of the second is a black powder. Metallic chromium has not been applied to any use in the arts.

CHROMIUM, CHLORIDE OF. *Syn.* Sesquichloride of Chromium. *Prep.* I. Dissolve the hydrated oxide in muriatic acid, and evaporate to dryness.

II. Digest chromate of lead in muriatic acid mixed with a little alcohol, and throw down the excess of lead with sulphureted hydrogen.

III. Pass dry chlorine over a mixture of chrome oxide and charcoal heated to redness, in a porcelain tube. The chloride collects as a sublimate, of a peach or purple color.

Remarks. By the first process the product is a green powder, which, when heated to 400°, becomes purplish red, and then forms pure, dry chloride of chromium. This process should be performed in a tube filled with carbonic acid gas.

CHROMIUM, OXIDE OF. *Syn.* Sesquioxide of Ditto. *Prep.* To a solution of chromate of potash, add another of protonitrate of mercury as long as any precipitate falls down. This must be well washed in water, and heated to redness in an earthen crucible.

II. Expose bichromate of potash to a strong red heat, then wash out the potassa with water.

III. Expose bichromate of potash, mixed with half its weight of sulphur, as above.

Prop. A green powder, insoluble in water. Fused with borax or glass, it imparts a beautiful green color. The emerald owes its color to this oxide. With the acids it forms salts which also have a green color. These compounds may be made by adding equal parts of muriatic acid and alcohol to a boiling solution of chromate of potassa, in water, in small portions at a time, until the red tint disappears, and the liquid assumes a green color. Pure ammonia, in excess, should now be added, when a hydrated green oxide will subside, which, after being washed with water, may be dissolved in the acids. Oxide of chrome is much used in the manufacture of colored glasses and enamels, and in dyeing.

Remarks. The above appears to be the only oxide of chromium, in opposition to the assertion of Berzelius, that there is a protoxide and deutoxide.

CHRYSAMMIC ACID. *Prep.* Add 1 part of aloes to 8 of nitric acid of sp. gr. 1·37, and heat the mixture in an open vessel. When the first violent action is over, introduce the whole into a retort, and distil to two-thirds. Then add 4 parts more of nitric acid, and keep the mixture nearly at the boiling point for some days, or as long as gas is disengaged. Water should next be added, which will throw down impure chrysammic acid, while chrysolepic acid and oxalic acid will remain in solution. The precipitate must be well washed with water combined with potash, and purified by recrystallization. The crystals are next dissolved in water, and nitric acid added, when a golden yellow powder will be deposited, which is chrysammic acid.

Prop. Soluble in alcohol, ether, and hot acids; explodes by heat, and forms salts, called chrysammates, with the bases. The salt of potash, prepared as above, is a beautiful crystalline carmine red powder, and when slowly produced it forms beautiful small greenish golden crystals. The salts of soda and magnesia are similar. Ammonia forms, with chrysammic acid, a deep purple solution, which deposites dark green crystals. The other salts of this acid are all of great beauty, and mostly of various shades of red, and exhibit a golden lustre under the polishing steel.

CIDER. *Syn.* Cyder. Pomatium. Cidre, (*Fr.*) The fermented juice of the apple. Cider and perry were known to antiquity, and are mentioned by Pliny, who calls them the wine of apples and pears. Modern Europe is, however, indebted to the Moors of Biscay, who introduced its manufacture into Normandy, whence it spread into the other provinces of France, into England, Germany, Russia, and America. The best cider made at the present day is that of Normandy, Herefordshire, and New Jersey, (U. S.,) and, next, that of Devonshire and Somersetshire. The last is, however, very inferior. Cider is made in all the temperate climates of the world, where the heat is insufficient to produce the grape, and the cold not so great as to interfere with the growth of the apple.

The process of making cider varies in different parts of England, but in every case essentially consists of—the collection of the fruit; the expression and fermentation of the juice; and the storing and management of the fermented liquor.

The apples are crushed or ground in a mill, and the pulp placed in haircloth or coarse canvass bags, and subjected to powerful pressure; the liquor which runs off is put into casks, and freely exposed to the air in the shade, and allowed to ferment. This part of the process is carefully watched, and as soon as the sediment has subsided, the liquor is racked off into clean casks. Before winter the

"The protoxide of lead, heated with chlorate of potassa in a glass tube closed at one end, gives puce oxide of lead, ($Pb\ O^2$,) mixed with a small quantity of minium. On this new reaction is founded the test which I propose with relation to the chlorates. It consists in slowly heating to fusion an intimate mixture of the chlorate and litharge in suitable proportion, covering it with a layer of chloride of sodium; in treating the fused mass with dilute nitric acid; then in collecting on a filter the puce oxide obtained, by aid of which the quantity of chlorate employed may be approximately calculated.

"This prompt and cheap process appears to me sufficiently accurate to be employed in the arts." (Comptes Rendus, xiv.)

CHLORATE OF BARYTA. (*Wheeler's process.*) Digest for a few minutes a concentrated solution of chlorate of potassa, with a slight excess of silicated hydro-fluoric acid. A precipitate of double fluoride of silicon and potassium will subside, and chloric acid remain in solution. Filter, neutralize with carbonate of baryta; again filter, when prismatic crystals of chlorate of baryta may be obtained by cautious evaporation.

Prop., &c. Soluble in 4 parts of cold water. Used to make chloric acid. This salt may also be formed by passing chlorine through a strong milk of hydrate or carbonate of baryta, in the same way as in making chlorate of potassa.

CHLORATE OF POTASSA. *Syn.* HYPEROXYMURIATE OF POTASH. OXYMURIATE OF DITTO. *Prep.* I. Transmit chlorine gas through a solution of pure potassa, or its carbonate, until the alkali be completely neutralized, then boil for a few minutes, gently evaporate until a pellicle forms on the surface, and set it aside, where it will cool very slowly. Crystals of the chlorate will form as the liquor cools, and must be collected, carefully washed with a little cold water, and purified by re-solution and crystallization. The mother liquor, by evaporation, will yield more crystals, or it may be saved for a future operation.

Remarks. This operation is best conducted in a Woolf's apparatus, or similarly arranged vessels. When the process is about half completed, as indicated by litmus paper, ceasing to be darkened, and beginning to be blanched, it is better to interrupt the operation, and to remove any chloride of potassium that may have fallen down; this may be washed with a little water, and the washings added to the liquor, when the chlorine should be again passed through the solution. When the bubbles of gas pass through without any being sensibly absorbed, the process is completed. The gas tube should be of large dimensions at the end immersed in the saline solution, and care should be taken that it does not get stopped up with crystals. In general the pure chlorate obtained from the second crystallization, amounts to about $\frac{1}{10}$ of the weight of the potash employed. The smallness of the product arises from a large portion being converted into chloride of potassium.

II. (*Graham's process.*) This consists in submitting equal equivalents of carbonate of potassa, and hydrate of lime mixed with water, to the action of chlorine, in a similar way to the above.

III. (*Liebig's process.*) *a.* The chlorine is passed into a mixture of one equivalent of chloride of potassium, and 6 equivalents of hydrate of lime, previously stirred with water to the consistence of a thin paste, whereby the lime unites with the chlorine, forming chloride of calcium, and the chloride of potassium is converted into chlorate potassa; the latter is then separated by crystallization. (Buchner's Repert.)

b. Heat chloride of lime in water until it ceases to affect vegetable colors, then dissolve it in hot water, concentrate by evaporation, and add chloride of potassium. After cooling, a quantity of crystals of chlorate of potassa are obtained. Chloride of lime, of so bad a quality as to be worthless for other purposes, may be employed; hence this is a very economical process.

IV. (*Vée's process.*) Heat a solution of chloride of lime, marking 18 or 20° Baume, in a leaden or cast-iron vessel, and when hot, dissolve therein enough chloride of potassium, to raise the hydrometer 3 or 4 degrees; then concentrate quickly, but cautiously, until the gravity of 30 or 31° Baume be obtained, and set it aside to crystallize. The mother water, concentrated to 36°, will yield more crystals. By re-solution in water, concentrating to 15 or 16°, filtering and again cooling, pure chlorate of potassa will be obtained This is a good and economical process.

V. (*Patent process of M. Romer.*) This consists in placing pure carbonate of potassa on shelves in an air-tight chamber, communicating with a retort, filled with the materials for generating chlorine, by which the alkali becomes surrounded with an atmosphere of chlorine. The operation is allowed to proceed for 12 hours without interference, after which, the heat of a water bath is applied to the retort for 6 hours longer. The apparatus is now opened, and the chlorate of potassa thus formed, is purified and freed from muriate by solution and crystallization. The materials for generating the chlorine, are—crystallized peroxide of manganese, in fine powder, 10 lbs.; plumbago 10 lbs.; common salt 30 lbs.; strongest oil of vitriol 20 lbs.; water 16 lbs.; the weight of the carbonate of potassa placed upon the shelves is 10 lbs Not being acquainted with the product obtained by this process, I cannot speak as to its value.

Prop., Uses, &c. Crystallizes in four and six sided pearly scales; dissolves in 16 parts of water at 60°, and in $2\frac{1}{2}$ parts at 212°. At about 450°, it undergoes the igneous fusion, and on increasing the heat *almost* to redness, effervescence ensues, and pure oxygen gas is given off. It yields 39·15§ by weight of this gas, (Ure,) and becomes changed into chloride of potassium. It will bear a heat of 600° Fahr. without undergoing any change. When mixed with inflammable substances, and triturated, heated, or subjected to a smart blow, it explodes with great violence. It also fulminates when thrown into strong acids. *As a medicine,* it is stimulant and diuretic. *Dose.* 5 to 15 gr. or more. It is principally used in the manufacture of fireworks, oxygen gas, lucifer matches, &c., and was formerly used to fill percussion caps, but was abandoned for fulminating mercury, as it was found to rust the nipples of the guns, which the latter does not do.

The following experiments with this salt, which are mentioned in most chemical works, may amuse the young experimentalist.—Rub 2 gr. into powder

in a mortar, add 1 gr. of sulphur, mix them well by gentle trituration, then collect the powder into a heap, and press upon it suddenly and forcibly with the pestle; a loud detonation will ensue. If the mixture be wrapped in strong paper, and struck with a hammer, the report will be still louder. 5 gr. of the salt, mixed in the same manner with $2\frac{1}{2}$ of charcoal, will be inflamed by strong trituration, especially if a grain or two of sulphur be added, but without much noise. If a little sugar be mixed with half its weight of the chlorate, and a little strong sulphuric acid poured on it, a sudden and vehement inflammation will ensue; but this experiment requires caution, as well as the following. To 1 gr. of the powdered salt in a mortar, add ½ a gr. of phosphorus; it will detonate with a loud report, on the gentlest trituration. In this experiment the hand should be defended by a glove, and great care should be taken that none of the phosphorus get into the eyes. Phosphorus may be inflamed by it under water, by putting into a wine glass 1 part of phosphorus and 2 of the chlorate, nearly filling the glass with water, and then pouring in, through a glass tube reaching to the bottom, 3 or 4 parts of sulphuric acid. This experiment, too, is very hazardous to the eyes. If olive or linseed oil be taken instead of phosphorus, it may be inflamed by similar means on the surface of the water. This salt should not be kept mixed with sulphur, or perhaps any inflammable substance, as in this state it has been known to detonate spontaneously. The addition of sulphuric acid to such mixtures immediately causes them to inflame and explode; but this experiment does not succeed with diamond powder. (Chenevix.)

Pur. The usual impurity is muriate of potash. This is readily detected by adding a few drops of a solution of nitrate of silver, which will give a curdy white precipitate soluble in liquor of ammonia, if a muriate be present, whereas the solution will remain clear, if the salt be pure. *The tests* are the same as those mentioned under chlorate. The salt may be known to contain potash, by the tests described under the article potassa, and may thus be distinguished from chlorate of soda.

CHLORATE MATCHES. *Prep.* Chlorate of potassa 30 grs.; flowers of sulphur 10 grs.; powdered lump sugar 8 grs.; powdered gum arabic 5 grs.; vermilion enough to color. *Proc.* Reduce the chlorate to fine powder in a marble or wedgewood-ware mortar, then place it on a stone slab, add the other ingredients, and mix them all together with a wooden or bone knife, adding just sufficient water to make a paste. Into this mixture the points of matches, made of slips of thin wood or pasteboard, are to be dipped, and afterwards carefully dried in a moderately warm situation.

Remarks. These matches, dipped into a little sulphuric acid, or exposed to smart friction, immediately enflame. The risk of spilling the acid may be avoided by placing a little asbestos in the bottle, and pouring thereon only as much sulphuric acid as the asbestos will absorb. It is only the composition on the match that should be touched with the acid, for if the wood be well wetted it will not burn. To ensure success it is best to dip them into melted brimstone to the height of about ⅛ of an inch before applying the composition. These matches once occupied the place that Lucifers did a few years since, and that Congreves do now.

CHLORATE, PRIMING, (FOR GUNS.) *Prep.* Pulverize the best gunpowder, and make it into a paste with water; then add half its weight of chlorate of potassa, and, while semi-fluid, drop it into the empty copper caps; place them aside in a warm situation to dry.

Remarks. The same precautions must be observed in mixing the ingredients, as directed in the last article. This priming is now superseded by fulminating mercury, which, as before observed, does not rust the nipple and foul the touchhole, like the chlorate mixture.

CHLORATES, (PER-.) Salts formed by the union of perchloric acid with the bases. The *perchlorate* of potassa may be formed by adding well-dried and finely-powdered *chlorate* of potassa, in small portions at a time, to an equal weight of concentrated oil of vitriol, gently warmed in an open vessel. The bisulphate of potassa formed must then be washed off with a *little cold water*, and the residuum of perchlorate dissolved in boiling water and crystallized. *Remarks.* These salts are distinguished from the chlorates by not turning yellow with hydrochloric acid. The other perchlorates may be formed by neutralizing the acid with the base. The *perchlorate* of potassa requires 65 times its weight of cold water for its solution, while the *chlorate* only requires 16.

CHLORIC ACID. An acid composed of chlorine and oxygen.

Prep. Dissolve chlorate of baryta in 16 times its weight of water; then add dilute sulphuric acid until all the baryta be precipitated as sulphate. The clear liquid may then be concentrated by evaporation until it acquires a thin oily consistence.

Props. In this state it has a yellowish tint, emits a smell like nitric acid, and sets fire to paper and other dry organic matter thrown into it. By heat it is resolved into chlorine and oxygen. It may be readily detected by its forming chlorate of potassa with that of alkali.

CHLORIC ACID, (PER-.) A compound of chlorine and oxygen, containing 2 eq. more of the latter than the last acid.

Prep. Put any quantity of powdered perchlorate of potassa into a retort, and pour thereon ½ its weight of strong sulphuric acid, previously diluted with an equal weight of water. Heat must now be applied, and as it rises to 284° F., vapors of this acid will pass over and condense as a colorless liquid in the receiver.

Remarks. This is a more stable compound than chloric acid, and does not inflame organic substances. By distilling it from concentrated sulphuric acid, Serullas obtained it in a solid form. In this state it hisses when thrown into water, like red-hot iron.

CHLORIDES. Compounds of chlorine with the bases in definite proportions. The tests for the chlorides are the same as for chlorine. (See CHLORINE.)

CHLORIDES OF CARBON. *Prep.* I. (*Perchloride.*) Expose the oily compound formed by mixing equal volumes of moist chlorine and olefiant gas, to the direct solar rays in a vessel full of chlorine gas. Hydrochloric acid is given off and

perchloride of carbon formed. *Props.* Solid; smells somewhat like camphor; it is twice as heavy as water, fusible, volatile; soluble in alcohol, ether, and oils, and slightly so in water; combustible.

II. (*Protochloride.*) When the perchloride of carbon is passed through a glass or porcelain tube filled with fragments of glass or rock crystal heated to redness, chlorine is separated, and a vapor formed, which must be condensed by the application of cold. This is the protochloride of carbon. *Prop.* Liquid, limpid, and colorless; vaporizes at 165° F.

CHLORINE. *Syn.* Oxymuriatic Acid. An elementary substance discovered by Scheele in 1774, and named by him dephlogisticated marine acid. It was afterwards called by the French chemists *oxygenized* and *oxymuriatic* acid, on the supposition of its being a compound of muriatic acid and oxygen. In 1809, Gay Lussac and Thernard suggested that it might be regarded as a simple substance; but it was reserved for Sir H. Davy to prove the truth of this suggestion. After some researches, in which every method of decomposing it was tried that genius and experience could suggest, he declared it to be a simple body, and gave it its present name, (from χλωρὸς, *green*,) on account of its color.

Prep. I. Mix together in a glass flask or retort strong muriatic acid with half of its weight of finely-powdered peroxide of manganese. Chlorine gas is immediately evolved even in the cold, but much more rapidly on the application of a gentle heat. *Remarks.* This gas must be collected in clean dry bottles by displacement. The tube conducting the gas must reach to the bottom of the bottle, when the chlorine, being heavier than the air, will displace the latter, without mixing with it. The bottle is known to be full by the gas overflowing the mouth, which is easily perceived by its green color. The bottle must now be closed up with an accurately-fitting stopper, previously greased, and an empty one put in its place, which must be subsequently treated in like manner. To free the gas entirely from muriatic acid, it may be passed through water; and to render it dry, it may be passed over dry chloride of calcium. Chlorine gas may also be collected over a saturated solution of common salt in the pneumatic trough.

II. Pour common muriatic acid, diluted with an equal weight of water, upon half its weight of chloride of lime, and proceed as before.

III. Pour sulphuric acid, diluted with water upon a mixture of common salt and binoxide of manganese previously placed in a retort. The proportions ordered by different authorities vary; the following are the principal:

Brand	4 water	5 acid .	3 oxide	8 salt.
Liebig	2 "	2 " .	1 "	3 "
Thernard . . .	4 "	4 " .	2 "	3 "
Graham . . .	as much dilute acid as contains	13 of oil vitriol	6 "	8 "

Remarks. The first or second process is the most convenient for small experiments in the laboratory, and the latter may be adopted where peroxide of manganese cannot be procured. The third is the cheapest method, and that employed on the large scale. Mr. Julius Seybel has lately taken out a patent for improvements in the manufacture of sulphate of soda and chlorine, which are formed by one operation. This is done by decomposing common salt by sulphuric acid, in closed vessels of lead, or lined with lead, having heat applied externally; and in employing the vapor of the muriatic acid thus formed to act on manganese immersed in water, such vapor being conducted below and permitted to escape upwards through the water and manganese.

Prop. Chlorine is a gaseous substance, possessing a yellowish green color, a pungent suffocating odor, and an astringent taste. Its most remarkable properties are, its power of destroying almost all vegetable and animal colors, and the putrid odor of decomposing organic matter; hence its value as a bleaching agent, and as a disinfectant and fumigant. Water absorbs twice its volume of this gas, and acquires a yellowish color. Under a pressure of about four atmospheres it condenses into a yellow transparent liquid. With the bases, chlorine forms an important series of compounds, called chlorides, chlorurets, or muriates, of which calomel and common salt may be taken as examples, the first being a chloride of mercury, and the second of sodium. The metallic chlorides are mostly solid at common temperatures, and all, save two, (mercury and silver,) soluble in water. They are fusible, and often crystalline. The chlorides of tin, antimony, arsenic, and mercury, are volatile and sublime unchanged. The chlorides are generally colorless, and resemble the salts in appearance. They are mostly decomposed by a strong heat. They are not decomposed by pure anhydrous sulphuric acid, but readily so by oil of vitriol. The metallic chlorides may generally be formed by the direct action of chlorine on the metals at common temperatures, and in many instances the union is accompanied by the evolution of light and heat. They may also be frequently formed by dissolving the oxides, carbonates, or hydrates of the bases, in muriatic acid, and crystallizing, or applying heat, until all the water is expelled. Chlorine has such a strong attraction for the metals that it displaces oxygen in nearly all cases at a red heat.

Tests. This gas is readily distinguished from other gases by its color, odor, and bleaching properties. It forms a white curdy precipitate with nitrate of silver, (chloride of silver,) which is insoluble in nitric acid, but readily so in liquid ammonia, and is blackened by light. Its aqueous solution dissolves gold leaf, and instantly blackens a piece of silver plunged into it. It rapidly destroys the color of iodide of starch, solution of indigo, litmus, and turmeric. The soluble chlorides may be readily detected by acidulating their solutions with nitric acid, and then adding a solution of nitrate of silver, when chloride of silver will be precipitated, and may be recognised in the way just mentioned. The insoluble chlorides may be tested by digesting them in a little liquor of potassa, when a solution of chloride of potassium will be formed, which may be treated as a liquid chloride; or the chloride may be dissolved in nitric acid, and tested with nitrate of silver as before. A simple method of detecting free chlorine is to hold a rod, dipped in

water of ammonia, over it, when white fumes of sal ammoniac will be formed; this, coupled with the property of bleaching colors, may, in most cases, be taken as evidence of the presence of this substance. (See CHLOROMETRY.)

Ant. When the fumes of chlorine are inhaled, it proves an irritative poison. The best antidotes are said to be ammoniacal gas or the vapors of warm water, of wine, or of ether. The writer of this article once suffered severely from getting a full inspiration of this gas, by the bursting of a large vessel employed in its manufacture, and which was full at the time. For a minute or two he was completely overcome; but, on being removed into the fresh air, he rapidly recovered, and, with the exception of a *violent* and *convulsive* cough, which lasted several hours, felt even better than he did before. The gas appeared to have acted both as a mental and bodily stimulant. Every known antidote was tried in this case, but without any apparent advantage. The effects gradually wore off, after the lapse of seven or eight hours.

CHLORINE, LIQUID. *Syn.* OXYMURIATIC ACID OXYMURIATIC WATER. SOLUTION OF CHLORINE. CHLORINE WATER. DEPHLOGISTICATED SPIRIT OF SALT. *Prep.* I. (*Aqua Chlorinii*, P. D.) Mix 87 parts of sulphuric acid with 124 of water, and pour it upon 100 parts of dried muriate of soda and 30 parts of oxide of manganese, previously mixed together and placed in a retort. Conduct the gas evolved into 200 parts of distilled water.

II. (*Aqua Chlorinei*, P. E.) Muriate of soda 60 grs.; red oxide of lead 350 grs.; triturate together, and put them into f℥ viij of distilled water contained in a stoppered bottle; then add 2 fluid drachms of sulphuric acid, put in the stopper, and agitate occasionally until the oxide of lead turns white. The clear liquid (after subsidence) is to be poured off into another stoppered bottle.

III. Pass chlorine gas, procured by any of the methods mentioned under Chlorine, into water, until it will absorb no more.

CHLORITES. Salts formed of the chlorous acid with the bases. The alkaline chlorites may be formed by passing a current of chlorous acid gas into a solution of the pure alkalis. They are soluble and remarkable for their bleaching and oxidizing properties.

CHLORITES, (HYPO-.) These are formed by the action of chlorine gas on the salifiable bases. Chloride of lime, soda, and potash are said by some to be hypochlorites, but this is undecided; in fact, the very existence of the hypochlorites has been denied.

CHLORO-CARBONIC ACID. *Syn.* PHOSGENE. CHLORO-CARBONOUS ACID. *Prep.* Expose equal volumes of carbonic oxide and dry chlorine to the rays of the sun, or diffused daylight. In the first case combination ensues in a few minutes, in the second after a few hours. *Prep.* A colorless gas, having a disagreeable odor; easily decomposed, especially by water.

CHLOROMETER. *Syn.* CHLORIMETER. An instrument for testing the strength of chlorides.

CHLOROMETRY. *Syn.* CHLORIMETRY. CHLORIMETRIE, (*Fr.*) The process or operation of testing the decoloring power of the compounds of chlorine. It is principally applied to those met with in commerce,—the chlorides of lime, potash, and soda. Among the numerous tests proposed for this purpose, the following appear to be those most worthy of notice.

I. (*Dalton's test.*) Weigh exactly 78 grs. of pure proto-sulphate of iron, previously dried by strong pressure between the folds of cloth, and dissolve it in 2 oz. of distilled water, to which add a few drops of muriatic or sulphuric acid. Next weigh out exactly 50 grs. of the chloride of lime, well mix it in a mortar with 2 oz. of tepid water, and pour the mixture into a graduated tube or alkalimeter. Then fill the measure up to 0 with the washings of the mortar. The whole should be now well mixed, by placing the thumb over the orifice and shaking it. The solution of chloride of lime is next to be gradually and cautiously added to the solution of sulphate of iron, until the latter be completely peroxidized, which may be known when it ceases to be affected by the red prussiate of potash. The latter test is applied by putting a drop of its solution upon a white plate, and touching it with the point of a glass stirrer or rod, dipped in the liquor under examination. As soon as the test indicates that enough of the solution of the chloride has been added, the number of measures poured from the alkalimeter must be carefully observed, from whence the richness of the sample may be estimated, as follows:—As 100 of the alkalimeter divisions contain exactly 50 grs. of the chloride, each measure will contain half a grain, and, consequently, any number of measures consumed, will represent half that number of grains of the chloride under examination; and the weight of the chloride thus used will have contained 10 grs. of chlorine—the constant quantity of that substance required to peroxide the given solution of sulphate of iron. Thus;—If 80 measures of the liquor in the alkalimeter be consumed, this quantity will have contained 40 grs. of the chloride and 10 grains of chlorine. By dividing 1000 by this number, the per centage of chlorine will be obtained, thus:

$$\frac{1000}{40}=25\%.$$

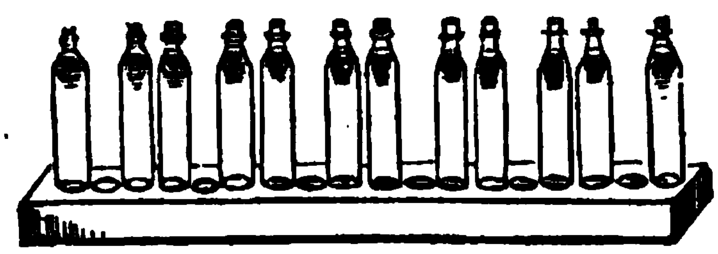
The above method admits of much greater accuracy, if the chloride of lime be dissolved in tepid water, placed in a Schuster's alkalimeter, previously weighed, and the solution made up to exactly 1000 grs. when cold. The quantity consumed may here be ascertained with great exactness. Every grain of the solution will be only equal to $\frac{1}{20}$ of a grain of the chloride. The quantity of the solution consumed is determined by weighing the alkalimeter before and after the operation. The difference is the quantity that has been used.

A modification of this plan has been suggested by Mr. Crum. He proposes to make the solution of the sulphate of iron in a stoppered bottle, and to add the chloride in the state of powder from a weighed quantity.

II. (*Crum's process.*) Mix equal weights of water and muriatic acid, and dissolve therein cast-iron borings until saturated. To ensure perfect saturation a large excess of iron is employed, and the liquid kept at the heat of boiling water for some time. One measure of the solution, marking 40° on Twaddle's scale, (sp. gr. 1·200,) is mixed with an equal quantity of acetic acid, (sp. gr. 1·048.)

This forms the proof solution, which, if mixed with 6 or 8 parts of water, is quite colorless, but chloride of lime occasions the production of peracetate of iron, which gives it a red color.

The above proof-solution is then poured into 12 two-oz. vials, of exactly equal diameters, to the amount of $\frac{1}{5}$ of their capacity; these are filled up with bleaching liquid of various strengths; the first at $\frac{1}{12}$ of a degree of Twaddle, the second $\frac{2}{12}$, and so on up to $\frac{12}{12}$ or 1°. They are then well corked up, and, after agitation, arranged side by side on a tray, furnished with holes to receive them, in the manner represented in the engraving. A se-



ries of test vials are thus formed, showing the various shades of color that the solutions of the given strengths are capable of producing. To ascertain the strength of an unknown sample of bleaching liquor, the proof solution of iron is put into a vial, exactly similar to the 12 previously used, and in precisely the same proportion, ($\frac{1}{5}$.) The vial is then filled up with the bleaching liquor, well shaken, and placed beside that one of the 12 already prepared which it most resembles in color. The number on that vial expresses the strength of the sample under examination, in $\frac{1}{12}$ths of a degree of Twaddle's hydrometer.

Table exhibiting the quantity of Bleaching Liquid, at 6° on Twaddle's scale, (sp. gr. 1·030,) required to be added to a weaker liquor, to raise it to the given strengths. Adapted from Mr. Crum's table by Mr. Cooley.

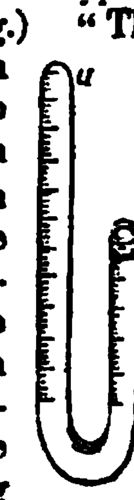
Strength of sample in $\frac{1}{12}$°.	Required Strength.	Proportions required. Given Sample.	Liquor at 6°.
		Parts.	Part.
Water.	$\frac{8}{12}$°	8	1
1	do.	$9\frac{1}{8}$	1
2	do.	11	1
3	do.	$13\frac{1}{3}$	1
4	do.	17	1
5	do.	23	1
6	do.	35	1
7	do.	71	1
Water.	$\frac{6}{12}$°	11	1
1	do.	$13\frac{1}{3}$	1
2	do.	17	1
3	do.	23	1
4	do.	35	1
5	do.	71	1
Water.	$\frac{4}{12}$°	17	1
1	do.	23	1
2	do.	35	1
3	do.	71	1
Water.	$\frac{3}{12}$°	23	1
1	do.	35	1
2	do.	71	1

Remarks. The preceding method is admirably suited for weak solutions, such as are employed for bleaching textile fabrics, and is well adapted (from its simplicity) to the purposes of practical men. It is employed in many of the Scotch bleaching houses.

According to Mr. Crum, the range of strength within which cotton is safe, is very limited. A solution at 1° of Twaddle's scale, (sp. gr. 1·005,) is not more than safe, while one at $\frac{1}{2}$° is scarcely sufficiently strong for the first operation on stout cloth, unless it be packed more loosely than usual. (Trans. Glasgow Phil. Soc.)

III. (*Ure's test.*) This consists in adding water of ammonia of a known strength, tinged with litmus, to a solution of a given weight of the chloride, until the whole of the chlorine be neutralized, which is known by the color ceasing to be destroyed. From the quantity of ammonia consumed, the strength is estimated. During the above process azote is evolved, and the estimation of the volume thus liberated has been proposed as another easy method of chlorimetry by Dr. Ure.

This gentleman recommends the two substances to be mixed in an inverted and graduated syphon tube over mercury. (See Engraving.) "The shut end *a* and the open end *b*, are both graduated to one scale; for example, to $\frac{1}{100}$ of an inch, or to grain or 10 grain measures. The tube is to be filled with mercury, and then 10 measures of it are to be displaced at the open end, by inserting a wooden plug. This space being filled with a solution of a given weight of chloride of lime, is to be turned up into the shut end, by covering the open end with the finger and inverting the tube; a few drops of water may be sent through to wash the mercury. The ammonia being now let up will cause a reaction, and evolve a quantity of azote, equivalent to the chlorine present. The action may be accelerated by holding the sealed end of the tube over the flame of a spirit-lamp. The mercury is protected from the chlorine by the ammonia; and should any notion be entertained of such an action, the ammonia may be let up first. I have made innumerable researches over mercury, with a detached apparatus of this kind, which combines precision with rapidity of result." (Ure's Dict. Arts.)



IV. (*Process of M. Gay Lussac.*) One part of the best indigo is dissolved in 9 parts of strong sulphuric acid, by the aid of a gentle heat. This solution is then mixed with distilled water, in such proportion, that 1 volume of chlorine gas shall exactly decolor 10 volumes of this solution. Each measure so decolored is called a degree, and each degree is divided into fifths. 5 grains of the best chloride of lime, dissolved in 500 grain measures of water, will possess the above power, and indicate 10° or proof, and will decolor 10 times its volume of the indigo solution. The objections to this method of chlorimetry are, that the indigo solution alters by keeping, and that it is not adapted for testing strong solutions of chloride of lime. "I have tried the indigo test in many ways, but never could confide in it." (Ure.)

CHLORO-NITROUS GAS. A gaseous compound, discovered by E. Davy. It is obtained

by treating fused chloride of sodium, potassium, or calcium, in powder, with as much strong nitric acid as is sufficient to wet it, when this gas is evolved. *Prop.* It has an orange color, smells like chlorine, and bleaches. Soluble in water.

CHLOROPHYLL. *Syn.* CHLOROPHILE. CHLOROPHYLE. The green coloring matter contained in the leaves, stalks, unripe fruit, and juices of most plants. It is extracted by ether, and purified by successive solutions in alcohol and muriatic acid; from the last it is precipitated pure by water.

Prop. A dark green mass, producing a grass-green powder. It is soluble in ether, alcohol, acids, alkalis, and oils. If an earthy or metallic salt be mixed with the alcoholic solution, and an alkaline carbonate be added, the earth or oxide is thrown down in combination with this coloring matter, forming a green lake, possessing considerable permanency. Pelletier and Caventou, who first discovered chlorophyll, obtained it by simply pressing the leaves, washing in water, and afterwards treating it with alcohol.

CHLOROUS ACID. *Syn.* PEROXIDE OF CHLORINE. A compound of oxygen and chlorine. *Prep.* Chlorate of potassa in fine powder, made into a paste with strong sulphuric acid, is put into a retort and heated in a water-bath, hot but not boiling. A yellowish green gas is given off, which may either be collected in dry bottles, or passed into water, when it will form liquid chlorous acid.

Props., &c. Its aqueous solution undergoes gradual decomposition, yielding chlorine and chloric acid. It possesses powerful oxidizing and bleaching properties, and unites with the bases forming salts called chlorites. These are all soluble in water, and possess bleaching powers like the acid. They may be recognised by the evolution of chlorous acid gas when acted on by an acid.

CHOCOLATE. *Syn.* CHOCOLADA. CHOCOLAT, (*Fr.*) The roasted cacao nut made into a paste by triturating it in a heated mortar, with sugar and aromatics, and cast in tin moulds, in which it concretes into cakes on cooling. The term is derived from two Indian words, *choco*, sound, and *atte*, water; because of the noise made in its preparation. (Dr. Alston.)

Qual. Chocolate is nutritive and wholesome, if taken in moderation, but is sometimes apt to disagree with weak stomachs, especially those that are easily affected by oily substances or vegetable food. The quantity of aromatics mixed with the richer varieties, improve the flavor, but render them more stimulant and prone to produce nervous symptoms, and complaints of the head.

Prep. The nuts are first roasted, (on the small scale this may be done in a frying-pan,) and after being cleared from the husks, reduced to coarse powder; they are then beaten in an iron mortar, the bottom of which is heated, until they are reduced to a paste, which is effected by the action of the heat on the oil or butter they contain. This paste or semi-fluid mass is then poured out into moulds, and left until cold, when it forms *cake chocolate*, or *chocolate paste;* or it may be reduced to coarse powder, by grinding, when it is known under the name of *chocolate powder*.

Remarks. Chocolate, prepared as above, without the addition of aromatics, is known in the trade as *plain chocolate*. The Spaniards flavor it with vanilla, cloves, and cinnamon, and frequently scent it with musk and ambergris. In general, they add too large a quantity of the last four articles. The Parisians, on the contrary, use but little flavoring, and that principally vanilla. They employ the best caracca nuts, and add a considerable quantity of refined sugar.

The mass of the common chocolate sold in England, is prepared from the cake left after the expression of the oil, and this is frequently mixed with the roasted seeds of ground peas, and maize or potato flour, to which a sufficient quantity of inferior brown sugar, or treacle and mutton suet is added, to make it adhere together. In this way is made the article commonly marked in the shops at 8*d.*, 9*d.*, and 10*d.* the pound. I know a person who lately bought a large quantity at 5*d.*, whereas good nuts, in their unprepared state, cost at wholesale more than double the money.

To excel in the manufacture of chocolate requires some little experience. The roasting of the nuts must be done with great care, and the process stopped as soon as the aroma is well developed. They should then be turned out, cooled, and fanned from the husks. On the large scale, chocolate is made in mills, worked by steam power, and the machinery employed in the grinding, admirably fulfils its duty.

The South American beans are esteemed the best for making chocolate. Like wine, it improves by age, if kept in a dry but not too warm a place.

CHOCOLATE CREAM. *Prep.* Chocolate scraped fine 1 oz.; thick cream 1 quart; sugar (best) 6 oz.; heat it nearly to boiling, then remove it from the fire, and mill it well. When cold, add the whites of 8 or 10 eggs; whisk rapidly, and take up the froth on a sieve; serve the cream in glasses, and pile up the froth on the top of them.

CHOCOLATE DROPS. Reduce 1 oz. of chocolate to fine powder by scraping, and add it to 1 lb. of finely-powdered sugar; moisten the paste with clear water, and heat it over the fire until it runs smooth, and will not spread too much when dropped out; then drop it regularly on a smooth plate. Avoid heating it a second time.

CHOCOLATE FOR ICING. *Syn.* SORBET AU CHOCOLAT. *Prep.* Rub 2 oz. of chocolate to a paste with 2 tablespoonfuls of hot milk, then add cream for icing 1 quart. Ice as wanted for use.

CHOCOLATE FOR THE TABLE. *Prep.* Put the milk and water on to boil; then scrape the chocolate fine, from one to two squares to a pint, to suit the stomach: when the milk and water boils, take it off the fire, throw in the chocolate, mill it well, and serve it up with the froth, which process will not take five minutes. The sugar may either be put in with the scraped chocolate, or added afterwards.

It should never be made before it is wanted; because heating again injures the flavor, destroys the froth, and separates the body of the chocolate; the oil of the nut being observed, after a few minutes' boiling, or even standing long by the fire, to rise to the top, which is the only cause why chocolate can offend the most delicate stomach.

CHOCOLATE, FRENCH. *Prep.* Finest ca-

timate their power, and consequently, generally add too much of them, and thus not only is the liquor rendered disagreeably high flavored, but the quantity of oil present turns it '*milky*,' or '*foul*,' on the addition of the water. This again is another source of annoyance, as from the consistence or viscidity of the fluid, it is less readily '*fined down*' than unsweetened liquor, and often gives much trouble to clumsy and inexperienced operators. The most certain way to prevent this is to use *too little*, rather than *too much* flavoring; for if the quantity prove insufficient, it may readily be '*brought up*,' even after the cordial is made.

A careful attention to the previous remarks will render this branch of the rectifier's art far more perfect and easy of performance than it is at present, and will, in most cases, produce at *once* a satisfactory article, '*fine*, *sweet*, and *pleasant*.'

It may be observed, before concluding this short notice, that the majority of cordials may be made with the pure essential oils, of *nearly* equal flavor to those prepared by distillation; and for such as *are colored*, simple digestion of the ingredients is almost universally employed. Inferior lump, or even good brown sugar is used for some dark and strong-flavored articles. Ingredients that are *not volatile*, are, of course, always added after distillation. Though I have said that very excellent cordials may be made *without* distillation, yet the *still* should be always employed to impart the flavor and aroma of volatile aromatics to spirits, when the expense, labor, and time are of no importance compared to the production of a superior article. The strength at which cordials are usually sent out by permits is 60 or 64 u. p.

CORDIAL, ANISEED. *Prep.* I. Aniseed (bruised) 1 lb.; proof spirit 6 gallons; macerate for a week; then distil 5 gallons; add 2 gallons of clear soft water, and 1 gallon of clarified sirup. This will make 8 gallons of cordial 24 u. p., which is as weak as "aniseed" should ever be made. It may be reduced by sweetened water.

II. Instead of distilling off the spirit, merely pass it through a wine-bag, to take off the seed, lower it with clear soft water, and sweeten as before.

III. Instead of 1 lb. of aniseed, add enough of the essential oil, dissolved in spirit of wine, to produce the desired flavor; 2 drachms of the oil is fully equal to 1 lb. of the seeds.

CORDIAL, BILIOUS, (CHAMBERLAIN'S.) An American medicine, prepared from the inner bark of the juglans cinerea, mixed with spices.

CORDIAL FOR CALVES. *Prep.* I. Caraways, powdered, ½ oz.; ginger and carbonate of soda, of each a spoonful; gin or brandy, ¼ of a wineglassful; water 6 oz.

II. Brandy ½ oz.; cow's urine 4 oz.; mix. (Gray.)

Use. As a stimulant for looseness, &c., in calves.

CORDIAL, CARAWAY. *Prep.* Bruised caraway seeds 3 lbs., or, essential oil of caraway 1½ oz.; sugar 56 lbs.; clean spirit, at proof, 40 gallons; water q. s.

Remarks. The addition of 30 drops of oil of cassia, and 20 drops each of essence of lemon and orange-peel, to the above quantity, improves the flavor; also a larger quantity of sugar must used, if the cordial is to be much lowered.

II. Seeds ¼ lb., or oil 1 drachm; proof spi[rit] gallon; sugar 3 lbs.; water q. s. As last.

CORDIAL, CEDRAT. *Prep.* I. Essence cedrat ¼ oz.; dissolve in pure proof spirit 1 ga[llon] add water 3 pints, agitate well; draw off 3 q[uarts] and add an equal measure of clarified sirup.

Remarks. This is a most delicious cordial.

II. Cut 12 lemons in pieces, and digest in [spirit] of wine 1 gallon; add water 1 quart; draw [off 1] gallon, and add an equal weight of capillaire. [In]ferior to the last.

CORDIAL, CINNAMON. This is sel[dom] made with cinnamon, but with either the ess[ential] oil, or bark of cassia. It is preferred colored, [and] therefore may be very well prepared by simp[le di]gestion. If the oil be used, 1 dr. will be fou[nd to] be enough for 2 or 3 gallons of spirit. The a[ddi]tion of 2 or 3 drops each of essence of lemon [and] orange peel, with about a spoonful of essen[ce of] cardamoms to each gallon, will improve it. S[ome] persons add to the above quantity 1 drach[m of] cardamom seeds and 1 oz. each of dried or[ange] and lemon peel. 1 oz. of oil of cassia is consi[dered] to be equal to 8 lbs. of the buds, or bark. [If] wanted dark it may be colored with burnt s[ugar.] The quantity of sugar is 1½ lb. to the gallon.

CORDIAL, CITRON. *Prep.* Yellow rin[ds of] citrons 3 lbs.: orange peel 1 lb.; nutmegs br[uised] 2 oz.; proof spirit 13 gallons; distil .. nace, add water sufficient, and 2 lbs. of fine lump s[ugar] for every gallon of the cordial.

CORDIAL, CLOVE. *Prep.* Bruised cl[oves] 1 oz., or essential oil, 1 dr. to every 4 gallo[ns of] proof spirit. If distilled it should be drawn [off] with a pretty quick fire. It is preferred of a [very] deep color, and is therefore strongly colored [with] poppy-flowers or cochineal, or more comm[only] with brandy coloring, or red sanders wood. [It] should have 3 lbs. of sugar to the gallon, and [this] need not be very fine. The addition of 1 drac[hm] of bruised pimento, or 5 drops of the oil for e[very] ounce of cloves, improves this cordial.

CORDIAL, CORIANDER. *Prep.* 1 lb. coriander seeds; 1 oz. of caraways, and the p[eel] and juice of 1 orange to every 3 gallons of p[roof] spirit.

CORDIAL, GOLD. *Prep.* Angelica r[oot] sliced, 1 lb.; raisins ½ lb.; coriander seeds 2 o[z.;] caraway seeds and cassia, of each 1½ oz.; clo[ves] ½ oz.; figs and sliced liquorice root, of each 4 o[z.;] proof spirit 3 gallons; water 1 gallon. Dig[est 2] days, and draw off 3 gallons by a gentle heat; [to] this add 8 lbs. of sugar dissolved in 1 quart e[ach] of rose-water and clear soft water, and steep [1] oz. of hay saffron in the liquid until it acquir[es a] proper color.

Remarks. The above is the form for a cord[ial] once in much esteem, and which derived its na[me] from a small quantity of gold leaf being added to [it.] It is now but little drunk, and this addition seld[om] made.

CORDIAL, GODFREY'S. *Prep.* I. M[o]lasses 15 lbs.; distilled water 2¾ gallons; dissolv[e,] add oil of sassafras 1 oz. dissolved in rectified sp[irit] of wine ½ gallon, bruised ginger ¾ oz.; cloves ½ o[z.;] laudanum 8 oz.; macerate for 14 days, and st[rain] through flannel.

stance, so long as carbonaceous matters from the fire are entirely excluded, and the required temperature is attainable. Unless strong heat is employed, no decomposition will take place; the temperature already employed in manufacturing this article from the nitrates, will be sufficient, and the furnaces used in every way suitable. The mass should be well raked about every half hour, to ensure the whole of it being sufficiently heated.

"Proceeding thus, the manufacturer may ascertain whether the process is complete by taking out a sample from the furnace, and treating it with a slight preponderance of dilute pure nitric acid, then adding chloride of barium; if, on this addition, much precipitate of sulphate is formed, the operation is not completed; but if, on the other hand, only a slight milkiness is produced, the 'batch' may be considered as finished.

"I have found, from numerous analyses, that different samples of the ore vary considerably in the quantity of oxide of chromium which they contain, and I therefore advise every manufacturer to analyze a fair average sample before he makes a purchase."

The following is the plan which Mr. Watt has adopted for this purpose:—

"Take a given weight of the ore, say 200 gr., previously reduced to a fine powder, and intimately mix it with twice its weight of the nitrate of potassa or soda,* adding a little slaked lime to prevent it from fluxing; place it in an iron crucible, and subject it to a strong red heat for about 3 or 4 hours; then treat the mass with water to dissolve out the chromate. The insoluble matter having been washed several times until the water has ceased to come off colored, the washings are to be added together and evaporated to concentrate the solution. This being done, it is to be treated with an excess of dilute sulphuric acid to liberate the chromic acid, and then treated with spirit of wine, by which the chromic acid will be reduced to the state of green oxide, which will remain in solution in the preponderance of sulphuric acid employed. A solution of caustic ammonia in excess is then to be added, which will precipitate the oxide of chromium; the mass is then boiled to evaporate the superabundance of ammonia.

"It must now be passed through a filter to collect the oxide, and a little fresh water poured on it to free it from any saline matter: then gently dry on the filter, when it may be entirely removed with ease, as the oxide, which was previously of a very bulky nature, contracts very considerably. It may then be subjected to a dull red heat in a silver, platinum, or porcelain crucible, and afterwards its weight ascertained, from which the per centage of oxide of chromium which the ore contains, and, consequently, the amount of sulphate required to convert it into a chromate, may be calculated." (Chemist, iv. 70.)

Prop., Uses, &c. The commercial chromate of potash has a bright yellow color, but in other respects, resembles coarse culinary salt. It is used in various processes in the arts,—in dyeing, bleaching, the manufacture of chromic acid, bichromate of potassa, and several other chromates.

* "It will be as well to use a nitrate in the analysis; the quantity being small, it will be of no consequence."

Pur. Chromate of potash is very commonly adulterated with sulphate and muriate of potash, it therefore becomes important to the manufacturer to be able to test its purity.

I. (*Test of M. Zuber.*) Add tartaric acid, dissolved in 50 parts of water, to a like solution of the sample. As soon as the decomposition is complete, and the color verges towards the green, the supernatant liquor should afford no precipitate with either the nitrate of silver or baryta, whence the absence of muriates and sulphates may be inferred. The proportions are, 8 parts of tartaric acid to 1 part of the chromate, both in solution. If saltpetre be the adulterating ingredient, the sample will deflagrate when thrown upon burning coals.

Mr. Watt says, "A short time ago, I was supplied with a sample which was nothing but sulphate of soda and chloride of sodium, colored with a strong solution of the chromate, and which caused a white precipitate in any of the soluble salts of lead. For the benefit of the purchaser, I subjoin the following method of examining the chromates of potassa and soda.

"First ascertain the quantity of moisture contained in the sample, by weighing out a certain portion, drying it on a sand-bath, and again weighing; the loss of weight will give the quantity of water: then dissolve it in distilled water, and add any soluble salt of lead until it ceases to give a precipitate. The mass is then to be boiled, and more distilled water added; the supernatant liquor is then to be poured off, and if the sample under examination contain any chloride of sodium, small shining crystalline needles of chloride of lead will form in the liquor as it cools. The remaining precipitate is then to be treated with strong nitric acid, which will decompose the chromate; by adding distilled water, the nitrate of lead, formed by the decomposition of the chromate of lead, will be dissolved, and the remaining sulphate of lead, if any, may be dried, and its amount ascertained, from which the quantity of sulphate in the chromate may be calculated.

"If it be required to ascertain the quantity of chloride, this may be done by redissolving the chloride of lead by means of heat, and operating on it by any of the soluble salts of silver." (Chemist, iii. 388.

CHROMATE OF POTASH, (BI- OR SUPER-.) *Prep.* Acidulate a concentrated solution of the neutral chromate with sulphuric, or, still better, the acetic acid. Then heat the liquid and allow it to cool slowly, when beautiful red crystals of bichromate of potash will be deposited. Its *Prop., Uses, and Tests* are the same as the neutral salt.

CHROMATE OF POTASH, SOLUTION OF. *Prep.* Dissolve neutral chromate of potash 1 oz., in distilled water 1 lb. *Use.* As a test liquor for metals, especially lead.

CHROMATE OF SODA. This salt may be prepared in the same way as chromate of potash, by employing a salt of soda instead of potassa in the preceding processes. It may also be made on the small scale for experiment, by neutralizing chromic acid with carbonate of soda.

Remarks. This salt has been proposed as a substitute for chromate of potassa, and has the advantage in cheapness. "Why nitrate of *potassa*

CORNS. Round, horny, cutaneous extuberances, with central nuclei, very sensitive at the base, arising from continued pressure over the projection of the bones, from *tight* or stiff shoes or boots. Corns are of two kinds, hard and soft. The former grow on the exposed portions of the joints, the latter between the toes.

Treat. First soak the feet in warm water for a few minutes, then pare the corns as close as possible with a sharp knife, taking care not to make them bleed. They may now be touched over with a little lunar caustic, or nitric acid. The former is used by merely rubbing it on the corns; previously *slightly moistened* with water; the latter by moistening them with it, by means of a strip of wood, or preferably a rod of glass. This treatment adopted every other day for 10 or 12 days, accompanied by the use of *soft, loose shoes*, will generally effect a cure. Concentrated acetic acid may be used instead of nitric acid, and is preferred by some persons from not staining the skin, but it is less active, and requires to be more frequently applied. It has been recommended to remove large corns by ligatures of silk, applied as close to the base as possible, and tightened daily until they drop off; but this plan is tedious, and is not always successful. Another mode of extirpation is the application of a small blister, which will frequently raise them with the skin out of their beds. In this case the exposed surface must be dressed with a little simple ointment. Soft corns may also be easily removed by applying ivy leaf previously soaked in strong vinegar, changing the piece every morning; or by placing a dressing of soap cerate, spread on a bit of lint or old rag, between the toes. One of the simplest and best remedies for hard corns, and which has lately received the sanction of high medical authority, is to wear upon the toe or part affected a small circular pi of soft leather, or still better, a piece of amad spread with diachylon or other emollient pla and having a hole cut in its centre the size of corn. (Sir B. Brodie.) By this means the pres of the boot or shoe is equalized, and the corn p tected.

Prevention. This consists in keeping the f clean, by frequent ablutions with warm water, the use of *easy, soft shoes or boots.* Without latter precaution, corns will generally return, e after they appear to have been perfectly remo

CORNS, POPULAR REMEDIES FOR. (*Lotion.*) Sal ammoniac 1 oz., spirit 4 oz.; diss Moisten the corn with this lotion every morn and evening.

II. (*Powder.*) Savine leaves 2 oz.; verdig oz.; red precipitate ½ oz.; all in powder. Mix. A plied by means of a piece of rag to the corn nigh

III. (*Plaster.*) White diachylon and ye rosin, of each 2 oz.; melt and add finely-powd verdigris 1 oz. For use, spread it on paper, li or leather, and apply a small piece to the corn.

CORN SOLVENT, SIR H. DAVY'S. P Potash 2 parts, salt sorrel 1 part; each in powder. Mix and lay a small quantity on corn for four or five successive nights, binding it with a rag.

CORRECTING PROOFS. (In Typogra The operation of marking on the proof sheets o work any errors of orthography, punctuation, rangement, or language, they may contain, also any alterations that may appear necess The following specimen will explain the meth generally adopted for this purpose, and with a li attention will enable any person to superintend work through the press, as far, at least, as pends upon the correction of the proofs:

hour until the process be completed, which may be known by the mass assuming a yellow color, instead of the grayish one it previously possessed. Care must be taken not to employ too much heat, as the product of this process (chromate of lime) is readily decomposed, and assumes a green color, in which case it is rendered useless. From the chromate of lime the acid is procured by the action of an equivalent proportion of sulphuric acid. This process has the great recommendation of cheapness, and Mr. Watt says that he has employed it in the factory of Messrs. Haws, for nearly two years, with *perfect success.*

Prop., Uses, &c. Pure chromic acid forms red crystals, and is soluble in water and alcohol. It is readily decomposed by the action of light and contact with organic matter. Hence it should be kept in stoppered glass bottles, and its solution filtered through asbestos. The ease with which it parts with a portion of its oxygen constitutes its value as a bleaching agent. It is largely employed in the arts, in calico-printing, bleaching of textile fabrics, tallow, oils, &c.

CHROMIUM, (from χρωμα, color.) A metal discovered by Vauquelin in 1797.

Prep. I. Mix dry chloride of chromium with oil, place the paste in a crucible lined with charcoal, lute on the cover, and expose it for an hour to an intense heat. (Vauquelin.)

II. Heat the compound of terchloride of chromium and ammonia to redness, and expose it to a current of dry ammoniacal gas. (Liebig.)

Remarks. The product of the first process has a whitish-yellow color, and a metallic lustre; that of the second is a black powder. Metallic chromium has not been applied to any use in the arts.

CHROMIUM, CHLORIDE OF. *Syn.* Sesquichloride of Chromium. *Prep.* I. Dissolve the hydrated oxide in muriatic acid, and evaporate to dryness.

II. Digest chromate of lead in muriatic acid mixed with a little alcohol, and throw down the excess of lead with sulphureted hydrogen.

III. Pass dry chlorine over a mixture of chrome oxide and charcoal heated to redness, in a porcelain tube. The chloride collects as a sublimate, of a peach or purple color.

Remarks. By the first process the product is a green powder, which, when heated to 400°, becomes purplish red, and then forms pure, dry chloride of chromium. This process should be performed in a tube filled with carbonic acid gas.

CHROMIUM, OXIDE OF. *Syn.* Sesquioxide of Ditto. *Prep.* To a solution of chromate of potash, add another of protonitrate of mercury as long as any precipitate falls down. This must be well washed in water, and heated to redness in an earthen crucible.

II. Expose bichromate of potash to a strong red heat, then wash out the potassa with water.

III. Expose bichromate of potash, mixed with half its weight of sulphur, as above.

Prop. A green powder, insoluble in water. Fused with borax or glass, it imparts a beautiful green color. The emerald owes its color to this oxide. With the acids it forms salts which also have a green color. These compounds may be made by adding equal parts of muriatic acid and alcohol to a boiling solution of chromate of potassa, in water, in small portions at a time, until the red tint disappears, and the liquid assumes a green color. Pure ammonia, in excess, should now be added, when a hydrated green oxide will subside, which, after being washed with water, may be dissolved in the acids. Oxide of chrome is much used in the manufacture of colored glasses and enamels, and in dyeing.

Remarks. The above appears to be the only oxide of chromium, in opposition to the assertion of Berzelius, that there is a protoxide and deutoxide.

CHRYSAMMIC ACID. *Prep.* Add 1 part of aloes to 8 of nitric acid of sp. gr. 1·37, and heat the mixture in an open vessel. When the first violent action is over, introduce the whole into a retort, and distil to two-thirds. Then add 4 parts more of nitric acid, and keep the mixture nearly at the boiling point for some days, or as long as gas is disengaged. Water should next be added, which will throw down impure chrysammic acid, while chrysolepic acid and oxalic acid will remain in solution. The precipitate must be well washed with water combined with potash, and purified by recrystallization. The crystals are next dissolved in water, and nitric acid added, when a golden yellow powder will be deposited, which is chrysammic acid.

Prop. Soluble in alcohol, ether, and hot acids; explodes by heat, and forms salts, called chrysammates, with the bases. The salt of potash, prepared as above, is a beautiful crystalline carmine red powder, and when slowly produced it forms beautiful small greenish golden crystals. The salts of soda and magnesia are similar. Ammonia forms, with chrysammic acid, a deep purple solution, which deposites dark green crystals. The other salts of this acid are all of great beauty, and mostly of various shades of red, and exhibit a golden lustre under the polishing steel.

CIDER. *Syn.* Cyder. Pomatium. Cidre, (*Fr.*) The fermented juice of the apple. Cider and perry were known to antiquity, and are mentioned by Pliny, who calls them the wine of apples and pears. Modern Europe is, however, indebted to the Moors of Biscay, who introduced its manufacture into Normandy, whence it spread into the other provinces of France, into England, Germany, Russia, and America. The best cider made at the present day is that of Normandy, Herefordshire, and New Jersey, (U. S.,) and, next, that of Devonshire and Somersetshire. The last is, however, very inferior. Cider is made in all the temperate climates of the world, where the heat is insufficient to produce the grape, and the cold not so great as to interfere with the growth of the apple.

The process of making cider varies in different parts of England, but in every case essentially consists of—the collection of the fruit; the expression and fermentation of the juice; and the storing and management of the fermented liquor.

The apples are crushed or ground in a mill, and the pulp placed in haircloth or coarse canvass bags, and subjected to powerful pressure; the liquor which runs off is put into casks, and freely exposed to the air in the shade, and allowed to ferment. This part of the process is carefully watched, and as soon as the sediment has subsided, the liquor is racked off into clean casks. Before winter the

CORROSION, PREVENTION OF. The best means of preventing the corrosion of metals is first to dip the articles into very dilute nitric acid, and afterwards to immerse them in linseed oil, allowing the superfluity of oil to drain off; they are by this means very effectively preserved from rust or oxidation. (W. J. Lander.)

COSMETICS. (*Cosmetica*, from Κοσμέω, *I adorn.*) Any external application used for the purpose of preserving or restoring the beauty. The term is generally understood to refer to substances applied to the cuticle, to improve the color and clearness of the complexion; but some writers have included under this head, every topical application to promote the personal appearance. Hence cosmetics may be divided into three kinds, viz.:—*Cutaneous cosmetics*, or those applied to the skin; *hair cosmetics*, or such as are employed to promote the growth and beauty of the hair; and *teeth cosmetics*, or such as are used to cleanse and beautify the teeth. The present article will be confined to a short notice of the first of these divisions, referring the reader to the separate heads —*hair dyes, pomatums, pommades, depilatories, dentifrices, tooth powders, &c.*, for information respecting the remainder.

CUTANEOUS COSMETICS. The most simple and universally employed cosmetics are soap and water, which at once cleanse and soften the skin. Soap containing a full proportion of alkali, exercises a solvent power upon the cuticle, a minute portion of which it dissolves; but when it contains a small preponderance of oily matter, as the principal part of the milder toilet soaps now do, it mechanically softens the skin and promotes its smoothness. Almond, Naples, and Castile soaps are esteemed for these properties, and milk of roses, cold cream, and almond powder, (paste,) are used for a similar purpose. To produce an opposite effect, and to harden the cuticle, spirits, astringents, acids, and astringent salts are commonly employed. The frequent use of hard water has a similar effect. The application of these articles is generally for the purpose of strengthening or preserving any given part against the action of cold, moisture, &c.; as the lips, or mammæ, from chapping, or the hands from contracting chilblains; but in this respect, oils, pommades, and other oleaginous bodies, are preferable.

Another class of cutaneous cosmetics are employed to remove freckles and eruptions. Among the most innocent and valuable of these, is Gowland's lotion, which has long been a popular article, and deservedly so, for it not only tends to impart a delightful softness to the skin, but is a most valuable remedy for many obstinate eruptive diseases, which frequently resist the usual methods of treatment. Bitter almonds have been recommended to remove freckles, (Celsus,) but moistening them with a lotion made by mixing 1 oz. of rectified spirit of wine, and a teaspoonful of muriatic acid, with 7 or 8 oz. of water, is said to do this more effectually. A safe and excellent cosmetic is, an infusion of horseradish in cold milk. (Withering.)

Skin paints and stains are employed to give an artificial bloom, or delicacy to the skin. Rouge and carmine are the articles most generally used to communicate a red color. The former is the only cosmetic that can be employed, without jury, to brighten a lady's complexion. The la though possessing unrivalled beauty, is apt to part a *sallowness* to the skin by frequent Starch powder is employed to impart a white and is perfectly harmless. The American la who are very fond of painting their necks wi use finely-powdered magnesia, which is also very innocent substance. Several metallic c pounds, as trisnitrate, subchloride, and oxide bismuth, (pearl white, Fard's white, &c.,) ca nate of lead, (flake white,) white precipitate, are frequently used to revive faded complexi but they are not only injurious to the skin, but as poisons, if taken up by the absorbents. T nitrate of bismuth, (pearl white,) probably least injurious of these articles, has caused s modic tremblings of the muscles of the face, e ing in paralysis. (Vogt. Pharm.) The employm of liquid preparations, containing sugar of le which are commonly sold under the name of m of roses, cream of roses, &c., is equally injuri Another disadvantage of these white meta preparations is, that they readily turn black, w exposed to the action of sulphureted hydro gas, or the vapors of sulphur, which freque escape into the apartment from coal fires. Th are many instances recorded, of a whole comp being suddenly alarmed, by the pearly comple of one of its belles being suddenly transform into a sickly gray or black. A friend of the w ter's was once startled at a Christmas party observing the one side of a lady's face and ne which was exposed to the fire, become discol in this way, and was so amused on learning cause, that he has since played two or three jo of the kind on some petulant old ladies, rema able for the great attention they pay to their t let. In conclusion it may be remarked, that best *purifiers of the skin* are soap and wa followed by the use of a *coarse* cloth, in opp tion to the *costly* and *soft diapers* that are c monly employed; and the best *beautifiers*, HEALTH, EXERCISE, and GOOD TEMPER.

COSMETIC, SIMPLE. *Prep.* Soft soa lb.; melt over a slow fire with a gill of sweet add half a teacupful of fine sand, and stir mixture together until cold. The shelly sea-s sifted from the shells, has been found better that which has no shells.

Remarks. This simple cosmetic has, for so years past, been used by many ladies who a markable for the delicate softness and wh of their hands, which they, in a great m attribute to the use of it. Its cheapness is a recommendation.

COUGH. The sudden and violent exp of air from the lungs. It is generally sy matic of other affections, but is sometimes i thic. Many cases of cough depend upon th tension of catarrh to the trachea and bro which thus become loaded with mucus or ph which they endeavor to throw off by the co sive effort called coughing. In some case caused by a vitiation and inspissation of the s tions, arising from the imperfect action of th sorbents; this is the common cause of th cough of old people. Idiopathic cough is not sidered dangerous in itself, or while runni

regular course, but it is often productive of most serious consequences, by superinducing the inflammation of some organ, or laying the foundation of phthisis.

Cough is sometimes attended by copious expectoration, and at other times exists without any; it has hence been distinguished into *moist* or *mucous* cough, and *dry* cough.

Treat. The treatment of common catarrhal cough consists in allaying the irritation as much as possible, by demulcents and expectorants, as mucilaginous drinks and lozenges, which act upon the glottis, and sympathetically upon the trachea and bronchiæ. Among the first may be mentioned, almond milk, barley water, refined Spanish juice, gum arabic, and a mixture of the last two made into lozenges; among the second, the most innocent and convenient is ipecacuanha, in the shape of lozenges, 2 or 3 of which may be sucked whenever the cough is troublesome. A light diet should be adopted, the bowels kept *slightly* relaxed by mild aperients, and a mild and equable temperature sought as much as possible. When this plan does not succeed, recourse may be had to an emetic, followed by small doses of Dover's powders, and extract or tincture of henbane, or squill pill. When a cough is troublesome at night, and unattended with fever, a small dose of laudanum, or tincture of henbane, taken on going to rest, will generally procure sleep. In the treatment of dry cough the more stimulating expectorants are useful, as garlic, ammoniacum, styrac, and benzoin, combined with narcotics and sedatives, as henbane, hemlock, and opium. A diaphoretic opiate is also very useful, especially in the cough of old people.

COUGH, POPULAR REMEDIES FOR. I. (*Draughts.*) *a.* Sirup of poppies 1 dessert-spoonful; antimonial wine 20 drops; mix for a dose, to be taken in a little warm tea on going to bed. *b.* Laudanum 30 drops; vinegar and honey, of each, a dessert-spoonful; ipecacuanha wine 25 drops; mix for one dose, as last.

II. (*Emulsion.*) Milk of almonds 4 oz.; sirup of squills and tolu, of each, 1 oz.; mix. *Dose.* A tablespoonful every 2 hours.

III. (*Mixtures.*) *a.* Tincture of tolu ½ oz.; paregoric elixir and tincture of squills, of each, ½ oz.; sirup of white poppies 1 oz.; mix. *Dose.* 1 teaspoonful in barley water, whenever the cough is troublesome. *b.* Milk of ammoniacum 4 oz.; sirup of squills 2 oz.; mix. A tablespoonful 3 or 4 times daily, for the cough of old persons. *c.* (*Dr. Munro's.*) Paregoric ½ oz.; sulphuric ether and tincture of tolu, of each, ¼ oz.; mix. *Dose.* A teaspoonful night and morning, or when the cough is troublesome, in a little warm water. *d.* (*Dr. Radcliff's.*) Sirup of poppies, sirup of squills, and paregoric, of each, ½ oz.; mix. *Dose.* As last.

COUMARINE. The fragrant volatile principle of the tonka bean, the diptera odorata of Wildenow. It is dissolved out by ether, and purified by alcohol. It crystalizes in small prisms.

COWHAGE. *Syn.* COWITCH. DOLICHIS PUBES. The down which grows upon the pods of the mucuna pruriens. (Dolichos pruriens.) It occasions violent itching, when it comes in contact with the skin, which can only be allayed by a solution of given vitriol or oil. It is frequently administered as a vermifuge, made into a confection, by scraping the hair off a pod into treacle, sirup, or honey, for a morning dose, which is repeated for 3 or 4 successive days, followed by a brisk purge.

COWS, MILCH, (CHOICE OF.) As to a choice of breeds for a private family, none in England, (says Mr. Lawrence,) probably combine so many advantages as the Suffolk dun-cows. They excel both in quantity and quality of milk; they feed well after they become barren; they are small-sized, and polled or hornless; the last a great convenience. The horns of cows which butt and gore others, should be immediately broad tipped. There is a breed of polled Yorkshire, or Holderness cows, some of them of middling size, great milkers, and well adapted to the use of families, where a great quantity of milk is required, and where price is no object, and food in plenty. If richer milk and a comparison of the two famous breeds be desired, one of each may be selected, namely, the last mentioned, and the other of the midland county, or long-horned species. Color is so far no object, that neither a good cow nor a good horse can be of a bad color; nevertheless, in an ornamental view, the sheeted and pied stock of the Yorkshire shorthorns make a picturesque figure in the grounds.

The Alderney cows yield rich milk upon less food than larger stock, but are seldom large milkers, and are particularly scanty of produce in the winter season. They are, besides, worth little or nothing as barreners, not only on account of their small size, but their inaptitude to take on fat, and the ordinary quality of their beef.

Feeding. There is nothing equal to rich pasturage for milch cows, but at such seasons, and during such weather that this cannot be procured, good hay, with turnips, carrots, potatoes, or mangel-wurzel, must be given instead, along with a sufficient quantity of clean water. The principal cowkeepers of the metropolis have dairy-farms in the suburbs, where the animals are turned out a portion of every day in the year, except during heavy rains, or when the ground is covered with snow. They are also well supplied with brewers' grains, tares, beet-root, &c., and great care is taken that they get fresh air, and exercise sufficient for their health. Such cows yield a large quantity of wholesome milk, very different to much that is sold in London, obtained from cows kept in stables, cellars, and other confined situations, and which are seldom supplied with green food. It has lately been shown by Boussingault, that mangel-wurzel, so commonly used for feeding cattle, is insufficient as an article of food. He found that a cow fed on this substance ceases to give her usual quantity of milk, and that even when other food was given along with it, the animal yielded less than her ordinary quantity. Before giving turnips to cows, the rotten or bad ones should be picked out, as it is said that even the presence of a single damaged one will flavor the milk, and perhaps spoil a whole dairy of cheese or butter.

Economy of a cow. The annual consumption of food per cow, if turned to grass, is from an acre to an acre and a half in the summer, and from a ton to a ton and a half of hay in the winter. A cow may be allowed 2 pecks of carrots

perceive any good effects to result from its administration.

COPAIBIC ACID. *Syn.* CAPIVIC ACID. The yellow brittle resin of balsam of copaiba. It is prepared by digesting the resin (left after distilling the oil from the balsam) in alcohol, which dissolves the acid resin, but leaves the viscid one. It may be purified by re-solution in alcohol. It forms about 50% of the balsam.

Prop. An amber-colored, brittle, semi-crystalline, resinous substance, soluble in alcohol, ether, and oils, reddens litmus paper, and forms salts with the bases, called copaivates. These may generally be made by dropping into a solution of the acid in alcohol, an alcoholic solution of a soluble salt of the base. The copaivates of potash, soda, and ammonia are easily prepared, by adding to an alcoholic solution of the acid another of the pure alkali, until it be neutralized, when the salts may be obtained by careful evaporation. Copaivate of silver is formed by neutralizing the acid with nitrate of silver, both being dissolved in alcohol, and then adding a little liquor of ammonia, when a white crystalline precipitate will subside. The copaivates of lead, lime, and iron, as well as several others, may be made in a similar manner.

Copaivate of magnesia may be made by adding copaivate of potassa to a solution of epsom salts. All these salts are easily decomposed by acids.

COPAL. *Syn.* GUM COPAL. A resinous substance, which exudes spontaneously from the Rhus copallinum, and the Elæocarpus copalifer. When of good quality, it is too hard to be scratched by the nail, and has a conchoidal fracture. It dissolves with difficulty, and this, combined with its extreme hardness, renders it very valuable for making varnishes.

SOLVENTS. I. *Caoutchoucine;* sparingly. II. Equal parts of *caoutchoucine* and *alcohol*, of ·825; freely soluble in the cold. III. *Absolute alcohol*, added gradually to the copal, previously rendered gelatinous by water of ammonia, assisting the union with heat. IV. *Alcohol* added to the copal, previously softened with ether. V. *Absolute alcohol* 1½ parts, digested on copal 1 part for 24 hours. (Unverdorben.) VI. *Alcohol*, to which a little camphor has been added. VII. *Ether;* and this solution may be diluted with alcohol. VIII. *Oils of rosemary* and *lavender*, (spike;) too expensive for general use. IX. *Copal*, heated until it fuses, acquires the property of dissolving in turpentine and alcohol. X. *Copal*, reduced to powder and exposed for some time to the air, also becomes soluble in alcohol and turpentine. XI. *Drying linseed oil*, at nearly the boiling point, dissolves copal, and will bear dilution with spirits of turpentine as soon as it has cooled sufficiently. This is the common way of making copal varnish. XII. *Ammonia* enables oil of turpentine to dissolve copal; but it requires such nice management of the fire, that it seldom succeeds completely. (Lewis.) XIII. *Powdered copal*, triturated with a little camphor, softens and becomes a coherent mass; and camphor, added either to alcohol or oil of turpentine, renders it a solvent of copal. ½ oz. of camphor is sufficient for 1 quart of oil of turpentine, which should be of the best quality; and the copal, about the size of a large walnut, should be broken into very small pieces, but not reduced to a fine powder. The mixture should be set on a fire so brisk as to make it boil almost immediately. The vessel should be of tin or other metal, strong, shaped like a wine-bottle with a long neck, and capable of holding 2 quarts. The mouth should be stopped with a cork, in which a notch is cut to prevent the vessel from bursting. (Sheldrake.) XIV. A good varnish may be made by pouring upon the purest lumps of copal, reduced to a fine mass in a mortar, colorless spirits of turpentine, to about one third higher than the copal, and triturating the mixture occasionally in the course of the day. Next morning it may be poured off into a bottle for use. Successive portions of oil of turpentine may thus be worked with the same copal mass. (Varley, Tilloch's Mag. 51.)

⁂ In all the above cases the copal should be reduced to a *coarse* powder. A *fine* powder is apt to stick together and form hard lumps. The solution of copal, even in its most ready solvents, is attended with some difficulty, and frequently miscarries in the hands of the inexperienced. A mixture of caoutchoucine and alcohol (as in No. II.) is an exception.

COPAL, MELTED. Obtained by holding the gum before a good fire, so that as soon as the copal melts, it may drop into a pan of water: a kind of oil separates from it, and the copal becomes soluble in spirits of wine, and still more so if the melting is repeated.

COPAL, POWDERED. Copal reduced to powder and exposed to the air in a thin stratum, on sieves covered with paper, for 3 or 4 months. Soluble in alcohol.

COPPER. (From *cuprum*, a corruption of *κύπρος*, from the island of Cyprus, whence it was formerly brought.) A red-colored metal, too well known to require description.

Hist. Copper and its alloys appear to have been known to the most remote ages of antiquity. Brass, an alloy of copper, is mentioned by Moses (Job, xxviii.) upwards of 1600 years before the birth of Christ. (Hales.) This metal is found in the metallic state, and in combination with oxygen, sulphur, acids, and other minerals, and in the organic kingdom, in the ashes of plants, and in the blood of animals. (Sarzeau.) The copper of commerce is principally prepared from copper pyrites, a mixed sulphuret of iron and copper, found in Cornwall, and other parts of the world.

Prep. Copper is only prepared from its ores on the large scale. The copper pyrites is first roasted, and then smelted, by which process "*coarse metal*" is produced; this is again submitted to calcination and smelting, when "*fine metal*" is obtained. It afterwards undergoes the process of refining and toughening.

Prop. This metal is malleable and ductile. It has a specific gravity of 8·8 to 8·9, fuses at about 2000° Fahr., and volatilizes at higher temperatures. It forms numerous compounds, all of which are more or less poisonous.

Char. and Tests. The solutions of copper possess a blue or green color, and yield a blue precipitate with soda or potassa. Ammonia produces a bluish-white precipitate, soluble in an excess of the precipitant, forming a deep blue solution. Prussiate of potash gives a reddish-brown precipitate, sulphureted hydrogen and hydrosulphurets, a black

me. A polished iron plate, immersed in an acidulous solution of copper, becomes coated with that metal.

Estim. The quantity of copper present in any compound, may be estimated by throwing it down from its solution by pure potassa, after which it must be carefully collected, washed, dried, ignited, and weighed. This will give the quantity of the oxide from which its equivalent of metallic copper may be calculated; every 5 parts of the former being (as near as possible) equal to 4 of the latter. Copper may also be precipitated at once in the metallic state, by immersing a piece of polished steel into the solution, but this method will not give very accurate results. Copper may be separated from lead by adding sulphuric acid to the nitric solution, and evaporating to dryness, when water digested on the residuum will dissolve out the sulphate of copper, but leave the sulphate of lead behind. From this solution the oxide of copper may be thrown down as before. Copper may be separated from zinc by sulphureted hydrogen, which will throw down a sulphuret of copper, which may be dissolved in nitric acid, and treated as above.

Uses. The applications of copper in the arts are too well known to require notice. In medicine, 3 or 4 grains of the filings were formerly given in rheumatism, and to prevent hydrophobia.

Ant. Copper in the metallic state appears to be inert, but most of its compounds are poisonous. The antidotes are, the white of egg, milk, or flour mixed with water. Iron filings (Payen, Chevallier, Dumas) and the prussiate of potash have also been recommended. A drachm or more of the latter may be taken dissolved in water, and ½ oz. or more of the former, ad libitum. Sugar has also been proposed as an antidote. (Duval, Postel.)

COPPER, ALLOYS OF. With *zinc* copper forms *brass*; with *tin*, *bronze*, *bell*, and *cannon metal*. An alloy made with 100 parts of copper and 50 of tin, forms *speculum metal*. *White copper* is formed by the addition of metallic arsenic, and *German silver* is a mixture of nickel, zinc, and copper. See these articles in their alphabetical places.

COPPER, ACETATES OF. I. (*Neutral Acetate. Syn. Distilled Verdigris. Binacetate of Copper. Crystallized Verdigris.*) *Prep.* Dissolve verdigris in vinegar, with the aid of heat, and crystallize. It forms dark green or blue crystals.

II. (*Diacetate. Syn. Verdigris. Ærugo.*) Formed by exposing sheets of copper to the vapor of acetic acid, in a warm situation. (See VERDIGRIS.) It forms a green or bluish-green powder.

III. (*Sesquibasic Acetate.*) The blue portion of verdigris, soluble in water.

IV. (*Trisacetate.*) The green insoluble portion of verdigris.

COPPER, ARSENITE OF. *Syn.* SCHEELE'S GREEN. *Prep.* Mix a solution of 2 parts of sulphate of copper in 44 of water, with a solution of 2 parts of potash of commerce, and 1 of pulverized arsenious acid, also in 44 of water. Both solutions being warm, the first is to be gradually poured into the second. The grass-green insoluble precipitate is to be washed with water.

COPPER, AMMONIURETED. *Syn.* CUPRO-SULPHATE OF AMMONIA. AMMONIATED COPPER, (P. E.) *Prep.* (*Ammonio-sulphate of Copper*, P. L.) Sulphate of copper ℥j; sesquicarbonate of ammonia ℥iss. Rub them together until carbonic acid ceases to evolve, then wrap it up in bibulous paper and dry it in the air.

Prop. By heat ammonia is evolved, and oxide of copper remains. Its aqueous solution changes the color of turmeric, and a solution of arsenious acid renders it green. (P. L.)

Uses. Employed in pyrotechny. It has been given in doses of ½ to 5 grs. in chorea, epilepsy, hysteria, &c., but it is principally employed as an injection and as a collyrium, in opacity of the cornea.

Remarks. Great care must be taken in drying this article, as it is apt not only to lose a large portion of its weight, but become of an inferior color. Both the ingredients should be separately reduced to powder before mixing.

COPPER, BEAN-SHOT. *Prep.* Melt copper, and pour it in a small stream into boiling water. It is in small lumps like peas or beans, hence its name.

COPPER, BLANCHED. *Prep.* Fuse copper with $\frac{1}{16}$ of its weight of neutral arsenical salt, under a flux of calcined borax, charcoal, and powdered glass.

COPPER, CARBONATE OF. *Syn.* DICARBONATE OF COPPER. MINERAL GREEN. *Prep.* Add a solution of carbonate of soda or potassa to a hot solution of protosulphate of copper.

Remarks. The beautiful green mineral called *malachite*, is a hydrated dicarbonate of copper. If the solution of copper in the above formula be employed cold, the precipitate has a bluish-green color. (See VERDITER.)

COPPER, CHLORIDES OF. *Prep.* I. (*Subchloride. Syn. Dichloride of Copper. Resin of ditto. White muriate of ditto.*) Distil a mixture of 1 part of copper filings, with two parts of corrosive sublimate.

II. (*Chloride. Syn. Muriate of Copper. Hydrochlorate of ditto. Protochloride of ditto.*) Dissolve protoxide of copper in muriatic acid, evaporate and crystallize.

Remarks. This salt forms green needles, is deliquescent, soluble in alcohol, and when heated, (under 400°,) loses its water, and becomes anhydrous chloride of copper, and assumes the form of a yellow powder. The first of these preparations is sometimes called the protochloride or muriate; the second the deutochloride.

COPPER, CHROMATE OF. *Prep.* Precipitate a salt of copper, with neutral chromate of potash; or dissolve hydrated peroxide or carbonate of copper in chromic acid. Caustic ammonia dissolves this salt, forming a magnificent dark-green liquid, from which, by the admixture of spirit of wine, ammonio-chromate of copper, or cupro-chromate of ammonia, is disengaged in the form of a powder of a splendid, rather dark-green appearance. The readiest way of preparing this permanent and beautiful color, is to add solution of chromate of potash to ammoniacal sulphate of copper.

COPPER, FEATHER-SHOT. *Prep.* Melted copper, poured in a small stream into cold water. It forms small pieces, with a feathered edge, hence the name. It is used to make solution of copper.

sale druggist in the city, produces an excellent article.

II. Hay saffron, cassia, and turmeric, of each 4 oz.; cardamoms 1 oz.; starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oil of nutmegs 2 drachms; oil of cloves 3 drachms. Reduce the dry ingredients to fine powder, and pass it through an 80 hole sieve, then add the oils, and after well mixing, pass it through a coarse sieve, (about 40 holes to the inch,) to ensure the whole being perfectly mixed.

The following form produces a powder possessing great depth and brilliancy of color.

III. Hay saffron 4 oz.; turmeric 3 oz.; powdered starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oils of cloves and cassia, of each 3 drachms; oil of nutmegs 2 drachms; essence of cardamoms 1 oz. *Proc.* Boil the saffron and turmeric in 1 gallon of water, placed in a bright copper pan, for 10 minutes, then, without straining, add the chalk, starch, and sugar; mix well, and continue stirring until the mixture becomes quite stiff, then break it up and dry it until fit for powdering. This must be performed in a water or steam bath. To the powder, passed through a fine sieve, as before, the oils and tincture must be added, and after being well mixed, and passed through a coarse sieve, it should be placed in a jar or bottle, and bunged up close.

Remarks. In the wholesale trade this article is kept under two forms: one in powder, as ordered by the College, and commonly called, for distinction sake, "*pulvis confectionis aromaticæ;*" the other mixed up ready for use. In preparing the latter, it is a common plan to make a strong infusion or decoction of the saffron, and to use it to mix up the other ingredients. Some persons follow the method described in the last formula, mixing up the powder to a proper consistence with water before adding the aromatics. When the price of *precipitated* chalk is an objection to its use, *prepared* chalk may be used instead. This confection is cordial, stimulant, and antacid. *Dose.* 10 to 60 grs.

CONFECTION OF BLACK PEPPER. *Syn.* WARD'S PASTE. *Prep.* (*Confectio Piperis Nigri,* P. L.) Black pepper and elecampane root, of each lb. j; fennel seed lb. iij; honey and white sugar, of each lb. ij; mix.

Remarks. The common practice is to keep the dry ingredients ready mixed in a bottle, and only to add the honey as wanted. The proportions are 2 parts of the latter to 7 of the mixture. The *dose* is 1 to 2 drachms 2 or 3 times a-day, in piles, fistula, &c. It should be persevered in for 2, 3, or 4 months, (Sir B. Brodie;) and as it is apt to accumulate in the bowels, its use should be accompanied by mild aperients. (Pereira.)

CONFECTIONS OF CASSIA. *Syn.* ELECTUARIUM CASSIÆ, (P. L. 1788.) *Prep.* (*Confectio Cassiæ,* P. L.) Fresh cassia pulp lb. ss.; manna ℥ij; tamarind pulp ℥j; sirup of roses f℥viij. Bruise the manna and dissolve it in the sirup, then add the pulps and evaporate to a proper consistence.

CONFECTION OF HEMLOCK. (Dr. Osborne.) *Prep.* Fresh leaves of hemlock and moist sugar equal parts; beat them to a confection in a mortar.

CONFECTION OF OPIUM. *Syn.* PHILONIUM ROMANUM, (P. L. 1720.) DITTO LONDINENSE, (P. L. 1745.) CONFECTIO OPIATA, (P. L. 1788.) DITTO OPII, (P. L. 1809, and since.) *Prep.* (P. L.) Powdered opium ʒvj; long pepper ℥j; ginger ℥ij; caraways ℥iij; tragacanth ʒij; all in fine powder; sirup f℥xvj. Mix.

Use and Dose. This confection is intended as a substitute for the *mithridate* and *theriaca* of the old Pharmacopœia. It is stimulant and narcotic, and is given in flatulent colic and diarrhœa unaccompanied by fever. The dose is from 15 to 50 grs.

CONFECTION OF ORANGE PEEL. *Syn.* CONSERVA FLAVEDINIS CORTICUM AURANTIORUM, (P. L. 1720 and 1745.) DITTO CORTICIS EXTERIORIS AURANTII HISPALENSIS, (P. L. 1788.) DITTO AURANTIORUM, (P. L. 1824.) DITTO AURANTII, (P. L. 1809 and 1836.) *Prep.* (P. L.) The external rind of the fresh orange, separated by rasping, lb. j; white sugar lb. iij. Beat the rind in a stone mortar with a wooden pestle, then add the powdered sugar, and beat the mixture until the two are perfectly incorporated.

Remarks. This confection is tonic and stomachic, and is principally used as a vehicle for the exhibition of tonic powders.

CONFECTION OF PEPPERMINT. *Prep.* Green peppermint 4 oz.; powdered white sugar 12 oz.; beat them together as last.

Use. Anti-emetic and flatulent. Given in colic, &c., in the form of a bolus, or made into a mixture.

CONFECTION OF THE DOG ROSE. *Syn.* CONFECTION OF HIPS. CONSERVA FRUCTUS CYNOSBATI, (P. L. 1720 and 1745.) DITTO CYNOSBATI, (P. L. 1788.) DITTO ROSÆ CANINÆ, (P. L. 1809, and since.) *Prep.* (P. L.) Pulp of the dog rose lb. j; powdered refined sugar ℥xx; mix by a gentle heat in an earthen vessel.

II. Pulped hips 2 cwt.; fine white sugar 2½ cwt.; incorporate them without applying heat.

Remarks. Both this and the following confection has a brighter color, if made without heat, or touching metallic vessels. On the small scale it is made by beating the ingredients together in a marble mortar, but in large quantities by grinding in a mill. It is slightly laxative, and is principally used for forming pills. It candies by keeping.

CONFECTION OF THE RED ROSE. *Syn.* CONSERVA ROSARUM RUBRARUM, (P. L. 1745.) DITTO ROSÆ, (P. L. 1788.) DITTO ROSÆ GALLICÆ, (P. L. 1809 and 1824.) CONFECTIO ROSÆ GALLICÆ, (P. L. 1836.) *Prep.* (P. L.) Petals of the red rose lb. j; refined sugar lb. iij; beat the petals in a stone mortar, then add the sugar, and again beat until thoroughly incorporated.

Remarks. On the large scale this is prepared like the confection of hips. It is astringent and tonic, and principally used for forming pills. If taken alone, the dose is 1 to 2 drachms.

CONFECTION OF RUE. *Syn.* ELECTUARIUM E BOCCIS LAURI, (P. L. 1720, 1745.) CONFECTIO RUTÆ, (P. L. 1809, and since.) *Prep.* (P. L.) Dried rue, caraway, and laurel berries, of each ℥iss; sagapenum (true) ℥ss; black pepper ʒij; honey ℥xvj. Reduce the dry ingredients to very fine powder, and when wanted for use, make them into a confection with the honey.

Use, &c. It is antispasmodic; in enemas 30 to

60 grs., with half a pint of gruel, for flatulent colic, &c.

CONFECTION OF SCAMMONY. *Syn.* ELECTUARIUM CARYOCOSTINUM, (P. L. 1720.) DITTO E SCAMMONIO, (P L. 1745.) DITTO SCAMMONII, (P. L. 1809 and 1788.) CONFECTIO SCAMMONEÆ, (P. L. 1809 and 1824.) *Prep.* (*Confectio Scammonii* P. L.) Scammony ℥iss; cloves and ginger, of each, ʒvj; oil of caraway fʒss. Reduce the ingredients to a very fine powder, and when wanted for use, make them into a confection with sirup of roses, and lastly add the oil.

Use, &c. Cathartic in doses of 10 to 30 grs.

CONFECTION OF SENNA. *Syn.* LENITIVE ELECTUARY. ELECTUARIUM SENNÆ, (P. L. 1788.) CONFECTIO SENNA, (P. L. 1809, and since.) *Prep.* (P. L.) Senna ℥viij; figs lb. j; pulp of tamarinds, prunes, and cassia, of each, lb. ss.; coriander seeds ℥iv; liquorice ℥iij; sugar lb. iiss; water 3 pints. *Proc.* Rub the senna and corianders in a mortar, and separate by sifting ℥x of the mixed powders. Boil the figs and liquorice in the water, until reduced to one half; then press and strain the liquor. Evaporate the strained liquor until only 24 fluid ounces remain, then add the sugar, and when dissolved, mix in the pulps, and lastly the powder.

Use, Dose, &c. Confection of senna is a gentle and pleasant purgative, and well adapted for persons suffering from piles, and as a laxative during pregnancy. The dose is ¼ to ½ oz. taken at bedtime or early in the morning.

Remarks. Perhaps there is no one pharmacopœial preparation which it is more difficult to obtain of good quality than the above. The absolute cost of an article prepared according to the directions of the College, will be somewhere about 1s. 9*d.* per lb.; but there are many wholesale drug houses vending confection of senna, which they warrant as genuine, at from 9*d.* to 1*s.* a pound. Dr. Paris (in his Pharmacologia) very truly remarks, that "the directions of the Pharmacopœia are very rarely followed." I understand that considerable quantities are manufactured, into which unsound and spoiled apples enter as a principal ingredient. The following forms are, to my knowledge, employed by some members of the trade.

II. Powdered senna, pulp of tamarinds, cassia, and prunes, of each, 1½ lb.; powdered corianders ¾ lb.; Spanish juice ½ lb.; simple sirup 12 lbs.

III. As the above, omitting the cassia pulp, and adding 2 lbs. more tamarind pulp.

Both these articles are labelled P. L., and sent out as genuine, and that when no competition as to price exists. The cheaper article is made as follows:

IV. Common prunes and tamarinds, of each, 16 lbs.; treacle ¾ cwt.; species (a compound of senna dust and small senna, mixed with 3 lbs. of coriander seeds, and strengthened with jalap, all ground to a fine powder) 18¾ lbs. To this is frequently added ¼ cwt. of rotten or inferior apples, which are pulped with the prunes and tamarinds. This article is not unfrequently labelled "CONF. SENNÆ VER." by the conscientious tradesman.

CONFECTION OF SULPHUR, (COMPOUND.) *Prep.* (St. B. H.) Precipitated sulphur ℥ss; cream of tartar ʒj; honey ℥j; mix As a laxative in piles, &c. *Dose.* ℥ss.

CONFECTION OF STEEL. *Syn.* CONFECTION OF CARBONATE OF IRON. *Prep.* Confection of orange-peel and sesquioxide of iron, (P. L.,) of each, 4 oz.; powdered white sugar 6 oz.; simple sirup 2 oz.; mix. Aromatic and tonic. *Dose.* A teaspoonful to ½ oz. twice or thrice daily.

CONGELATION, (from *congelo*, to freeze.) IN CHEMISTRY. The conversion of a liquid into a solid state, by the action of cold.

The production of an extreme degree of cold is often of the utmost importance in chemical operations, and an easy method of doing so is consequently a desideratum. The means hitherto adopted for this purpose have either depended upon the sudden liquefaction of solids, or the abstraction of heat by rapid evaporation. The loss of sensible heat, by the first method, is the basis of the various processes of producing cold by what are commonly called freezing mixtures, all of which act upon the principle of liquefying solid substances without supplying heat. The caloric of liquidity being in these cases derived from that previously existing in the solid itself in a sensible state, the temperature must necessarily fall. The degree of cold produced, depends upon the quantity of heat which is thus diffused through a larger mass, or which, as it were, disappears, and this is dependent on the quantity of solid matter liquefied, and the rapidity of the liquefaction. Saline compounds are the substances most frequently employed, and those which have the greatest affinity for water, and thus liquefy the most rapidly, produce the greatest degree of cold. Thus it is, that chloride of calcium and nitrate of ammonia, when dry and in fine powder, if suddenly mixed with water, produce extreme cold. The latter, suddenly mixed with an equal weight of water at 50°, will sink the thermometer to +4°, or 28° below the freezing point. The most common and convenient freezing mixture, when snow can be procured, is formed by mixing 2 parts of that substance with 1 part of sea-salt. This will sink the thermometer to —5°, or 37° below the freezing point of water. Equal parts of these substances produce a degree of cold marked by the zero of Fahrenheit's thermometer, and is the standard taken for graduating that instrument. Mr. Walker, a gentleman who fully investigated this subject, recommends the following proportions for the production of extreme cold.

PEAU. BEZETTA CŒRULEA. *Prep.* I. Color pieces of clean linen with auvergne or ground archel, (lichen parellus.)

II. Dip pieces of clean linen into the juice of mulberries, blood-red grapes, lees of red wine, &c.

Use. To color jellies and confectionary, and the rind of cheeses.

CLARIFICATION. This word (from *clarus*, clear, and *facio*, I make) means, properly, any process of freeing a fluid from heterogeneous matter, and thus includes filtration. In its commoner sense, however, it is applied to the process of clearing liquids by the addition of some substance that either inviscates the feculous matter, and subsides with it to the bottom, or, that induces such a change in its nature or bulk, that it subsides by its own density, in each case leaving the liquor transparent. Albanum, gelatin, acids, certain salts, blood, lime, plaster of Paris, alum, heat, alcohol, &c., serve in many cases for this purpose. The first is used under the form of white of egg, for the clarification of sirups, as it combines with the liquid when cold, but on the application of heat, rapidly coagulates and rises to the surface, carrying the impurities with it, forming a scum which is easily removed with a skimmer. It is also much used for fining wines and liqueurs, particularly the red wines and more limpid cordials. Gelatin, under the form of isinglass, dissolved in water, or weak vinegar, is used to fine white wines, beer, cider, and similar liquors, that contain a sufficient quantity of either spirit or astringency (tannin) to induce its precipitation. Sulphuric acid is frequently added to weak liquors for a similar purpose, either alone, or after the addition of white of egg, or gelatin, both of which it rapidly throws down in an insoluble form. A pernicious practice exists among some unprincipled parties, of using certain salts of lead and potash to clear their liquors, especially those that are expected to sparkle in the glass, as cordial, gin, &c. For this purpose, a little sugar of lead, dissolved in water, is first mixed up with the fluid, and afterwards about half its weight of sulphate of potash, also dissolved in water, is added, and the liquor is again roused up. By standing, the sulphate of lead, formed by this mixture, subsides, and leaves the liquor clear. Blood is used in the same way as isinglass or white of eggs, for fining red wines, beer, and porter. Lime, alum, alcohol, and heat, act by curdling or coagulating the feculencies, and thus, by increasing their density, induce their subsidence. Plaster of Paris acts partly like the above, and partly like albumine, or gelatin, by enveloping and forcing down the suspended matter. Sand is often sifted over liquors for the simple purpose of acting by its gravity, but appears to be quite useless. The juices of plants are clarified by heat, which coagulates the albumine they contain. Marl, or clay, is frequently used to clear cider and perry. A strip of isinglass is generally employed to clarify coffee. (See WINES, BREWING, CORDIAL, COFFEE, INFUSION.)

CLEANING. The best way to clean a house is to *keep it clean* by a daily attention to small things, and not allow it to get into such a state of dirtiness and disorder as to require great and periodical cleanings. Some mistresses, and also some servants, seem to have an idea that a house should undergo "regular cleanings," or great washing and scrubbing matches once every three or six months, on which occasions the house is turned almost inside out, and made most uncomfortable. All this is bad economy, and indicates general slovenliness of habits. (Chambers.)

CLEAR-STARCHING. This is practised as follows: "Rinse the articles in three waters, dry them, and dip them in a thick starch, previously strained through muslin; squeeze them, shake them gently, and again hang them up to dry; and when dry, dip them twice or thrice in clear water, squeeze them, spread them on a linen cloth, roll them up in it, and let them lie an hour before ironing them. Some persons put sugar into the starch to prevent it sticking while ironing, and others stir the starch with a candle to effect the same end; we object to these practices as injurious to the article starched, or as very nauseous. The best plan to prevent sticking is to make the starch well, and to have the irons quite clean and highly polished."

CLOTH, CLEANING AND SCOURING OF. The common method of cleaning cloth is by beating and brushing, unless when very dirty, when it undergoes the operation of scouring. This is best done on the small scale, as for articles of wearing apparel, &c., by dissolving a little curd soap in water, and, after mixing it with a little ox-gall, to touch over all the spots of grease, dirt, &c., with it, and to rub them well with a stiff brush until they are removed, after which the article may be well rubbed all over with a brush or sponge dipped into some warm water, to which the previous mixture and a little more ox-gall has been added. When this has been properly done, it only remains to thoroughly rinse the article in clean water until the latter passes off uncolored, when it must be hung up to dry. For dark-colored cloths the common practice is to add some fuller's earth to the mixture of soap and gall. When *nearly* dry, the nap should be laid right, and the article carefully pressed, after which a brush, moistened with a drop or two of olive oil, should be several times passed over it, which will give it a superior finish. Cloth may also be cleaned in the dry way as follows:—First, remove the spots as above, and, when the parts have dried, strew clean damp sand over it, and beat it in with a brush, after which brush the article with a hard brush, when the sand will readily come out, and bring the dirt with it. *Black cloth* which is very rusty, should receive a coat of reviver after drying, and be hung up until the next day, when it may be pressed and finished off as before. *Scarlet cloth* requires considerable caution. After being thoroughly rinsed, it should be repeatedly passed through cold spring water, to which a tablespoonful or two of solution of tin has been added. If much faded, it should be dipped in a scarlet dye-bath. *Buff cloth* is generally cleaned by covering it with a paste made with pipe-clay and water, which, when dry, is rubbed and brushed off.

Fruit spots and similar stains may frequently be removed by holding the part over a common brimstone match, lighted, or by water acidulated with a little salt of lemons, oxalic or muriatic acid; but care must be taken not to apply this liquid to colors that it will injure.

The stains of acids may be removed by washing the part with a little spirits of hartshorn or

liquid ammonia; *those of alkalis*, by water acidulated with lemon juice or tartaric acid.

Grease spots may generally be taken out by means of a little soft soap; or, if the color be delicate, or a false dye, a little ox-gall or curd soap will be better. These must be used as above described. *Stains of painters' oils, wax, paints, or varnishes*, will not usually yield to the above plan; in these cases, a simple way is to soak the part in spirits of turpentine, and, when softened, to wash it off with the same fluid. Ether or essential oil of lemons will also quickly remove these spots, but is too expensive for general use.

CLOTH, INCOMBUSTIBLE. This is made of fibres of asbestos by weaving. It will bear a considerable heat without injury. Cotton and linen fabrics prepared with a solution of sal ammoniac, or phosphate of ammonia, may be placed in contact with ignited bodies without danger. They will carbonize, but not inflame. Solutions of alum, sea salt, &c., have been used for the same purpose. It is by a knowledge of this property of culinary salt, that jugglers are enabled to perform the common trick of burning a thread of cotton while supporting a ring or a key, without the latter falling to the ground. The cotton is reduced to a cinder, but, from the action of the salt, its fibres still retain sufficient tenacity to support a light weight.

CLOTH, RENOVATION OF. The article undergoes the process of scouring before described, and, after being well rinsed and drained, it is put on a board, and the threadbare parts rubbed with a half-worn hatter's card, filled with flocks, or with a teazle or a prickly thistle, until a nap is raised. It is next hung up to dry, the nap laid the right way with a hard brush, and finished as before. When the cloth is much faded, it is usual to give it a "dip," as it is called, or to pass it through a dye-bath, to freshen up the color.

CLOTHES, BRUSHING AND PRESERVATION OF. If very dusty, hang them on a horse or line, and beat them with a cane; then lay them on a clean board or table, and well brush them, first with a stiff brush, to remove the spots of mud and the coarsest of the dirt, and next with a softer one, to remove the dust and to lay the nap properly. If clothes be wet and spotted with dirt, dry them before brushing, and then rub out the spots with the hands. The hard brush should be used as little as possible, and then with a light hand, as it will, if roughly and constantly employed, soon render the cloth threadbare. Should there be spots of tallow-grease on the clothes, take it off with the nail, or, if that cannot be done, have a hot iron with some thick brown paper, lay the paper on the part where the grease is, then put the iron upon the spot; if the grease comes through the paper, put on another piece, till it ceases to soil it.

After the clothes are brushed, they should be hung up in a clean place, free from dust, if wanted for immediate use; but if intended to remain unused for some time, they should be placed away on the shelves of the clothes' closet or wardrobe. The latter should always be in the driest situation possible, as if the clothes be exposed to the least damp, they not only acquire an unpleasant smell, but gradually become rotten.

CLOVES. The flower buds of the eugenia caryophyllata, dried and smoked. It is a common practice to adulterate this spice in the same manner as cinchona bark. Cloves from which the oil has been distilled are dried and rubbed between the hands, previously moistened with a little sweet oil, to brighten their color, after which they are mixed up with fresh spice for sale.

COACH ACCIDENTS. "Should the horses run off, in defiance of all restraint, while you are in a coach, sit perfectly still, and in anticipation of the possible overturn, keep your legs and arms from straggling. Sit easily and compactly, so that, when upset, you will gently roll over in the direction you are thrown. We have seen ladies in these circumstances scream wildly, and throw their arms out of the windows, thus exposing themselves to the chance of broken limbs. If run away with in a gig, either sit still collectedly, or drop out at the back, so as to fall on your hands. Never jump from a rapidly-moving vehicle, unless (supposing it impossible to slip down behind) you see a precipice in front, in which case any risk of personal damage is preferable to remaining still. The Duke of Orleans lost his life by neglecting these simple precautions."

COAK. *Syn.* COKE. CHARRED COAL. MINERAL CHARCOAL. Carbonized coal. The principle of its manufacture is similar to that of charcoal. There are three varieties of coak, viz.

I. (*Kiln-made coak. Stifled coak.*) Made by burning the coal in a pile, kiln, or stove. It has a dull black color, and produces an intense heat when used as fuel. The coal is frequently burnt in a series of shallow stoves, with as little access of air as will support the combustion, and the smoke conducted through proper horizontal tunnels to a capacious brick chamber, 100 yards or more in length, kept as cool as possible by a stream of water passing over its roof, or by a shallow pond resting on it. Here the bituminous vapors are condensed in the form of tar, along with a considerable quantity of crude ammoniacal salt. Common coal yields about 3§ of tar when treated in this way, but some strong bituminous coal will give $\frac{1}{7}$ or $\frac{1}{8}$ of its weight. This tar, when inspissated, gives 75§ of pitch, and 20 to 24§ of a crude species of naphtha, that is excellent for out-door painting. The ammonia is made into sal ammoniac. The *screenings*, or dust-coal, separated from the better kinds of bituminous coal, is the sort commonly used for making coak in ovens.

II. (*Gas coak. Distilled coak.*) The cinder left in the retorts after the gas has been distilled off. Its color is gray, and it only produces a weak heat in burning, not sufficient to smelt iron.

III. (*Slate coak. Carbon mineral.*) From bituminous slate, burned in covered iron pots, in a similar way to that adopted for making bone-black. Also burnt in piles. It is black and friable. Used to clarify liquids, but vastly inferior to bone-black, and does not abstract the lime from sirups.

COBALT. *Syn.* REGULUS OF COBALT. A metal discovered by Brandt, in 1733. It is found in ores, associated with arsenic and other metals, and is constantly present in meteoric iron.

Prep. Dissolve oxide of cobalt in muriatic acid, and pass sulphureted hydrogen gas through the solution, until all the arsenic is thrown down; filter and boil with a little nitric acid, then add an ex-

tion with a weak solution of carbonate of potassa, repose, and decantation. It is lighter than water, boils at 425° Fahr., and has an odor resembling an empty wine cask or bottle that has been exposed to the air for some time. As obtained by distillation, it is united with a little œnanthic acid. 2200 imperial gallons of wine (about 35 hogsheads) only yielded 2½ lbs. of the mixed oil.

ETHER, OXALIC. *Syn.* OXALATE OF OXIDE OF ETHULE. NEUTRAL DO. A colorless oily liquid, slightly heavier than water, boiling at 370° Fahr., and having an aromatic smell. It was discovered by Thenard.

Prep. Binoxalate of potassa, and alcohol of 90%, of each 4 parts; oil of vitriol 5 parts; mix in a glass retort and distil with a quick fire; as soon as the product becomes turbid when mixed with water, change the receiver, agitate the subsequent product with 4 or 5 times its weight of water, and repeat the agitation with fresh water until the ether becomes neutral to test paper; then rectify it in a dry retort that it will about nine-tenths fill, and as soon as the boiling proceeds smoothly, instead of by jerks, change the receiver; the remaining product will be pure anhydrous oxalic ether. (Ettling.) See ETHERS, ORGANIC.

ETHER, PHOSPHORATED. *Syn.* ÆTHER PHOSPHORATUS. *Prep.* (P. Cod.) Phosphorus, cut small, 1 part; ether 50 parts; digest with occasional agitation for 1 month, and decant the clear.

ETHER, SULFURIQUE IODURE. *Syn.* ETHEREAL TINCTURE OF IODINE. *Prep.* Iodine 40 grs.; sulphuric ether ℥j; dissolve. *Dose.* 5 to 10 drops, where the use of iodine is indicated.

ETHER, SULFURIQUE AVEC LE DEUTOIODURE DE MERCURE. *Syn.* ETHEREAL TINCTURE OF BINIODIDE OF MERCURY. *Prep.* Biniodide of mercury 16 grs.; sulphuric ether ℥iss; dissolve. *Dose.* 5 to 12 drops.

ETHERS, ORGANIC. The preparation of some of the organic ethers has been found to be attended with considerable difficulty, and hence have arisen various contrivances to induce the organic acids to combine with the ethereal base. Among the methods generally adopted until lately, may be mentioned the admixture of a salt of the organic acid with alcohol, to which some strong inorganic acid is added, when the acid of the salt being liberated in the nascent state, it enters into a new combination, forming ether. In this way acetic and oxalic ethers are commonly prepared. Or the organic acid being mixed with alcohol, sulphuric or hydrochloric acid is added, by which an organic ether is produced. Benzoic ether may be taken as an instance of this mode of operating. Ethers have also been formed by the simple distillation of some of the organic acids with alcohol, but this method is usually tedious, and requires the repeated return of the products of distillation into the retort, as well as considerable time for its performance, to which several other objections may be added. More recently it has been shown that when the organic acids are heated nearly to their point of decomposition, and alcohol is gradually and cautiously dropped on them, ethers of those acids are readily formed. In this way many of the acids which are wholly or partly volatile—as the oxalic, benzoic, and succinic acids,—yield large quantities of ether. (Gaultier de Claubry.) This method is applicable to most acids that do not suffer decomposition at a low temperature, but in other cases the product would be vitiated and uncertain. Thus, citric acid under this treatment might yield citric, itaconic, citraconic, or aconitic ether, or a mixture of two or more of them, and this in a way entirely beyond the power of the operator to influence. Another method recommended, and very suitable to the preparation of the ethers of the fatty acids, is—to dissolve the organic acid in alcohol, and to pass a current of muriatic acid gas through the solution. A still simpler plan, and which appears likely to supersede most others, at least in the majority of cases, is to mix equal parts of alcohol and the organic acid, with ¼th or ⅛th of oil of vitriol, and to place it in a flask or digester, fitted with a cork, through which passes an upright thin glass tube, 5 or 6 feet long, and after luting the joint quite securely, to submit the mixture to gentle ebullition in a sand-bath, or over a spirit lamp for several hours. In this way the spirituous and ethereal vapors are condensed in the cool portions of the tube, and fall back again into the matrass, by which means no loss of either can possibly occur. A Liebig's refrigerator *reversed* may also be used for this purpose. (See ETHER.) By this method some ethers may be readily formed that can scarcely be obtained pure in the usual way. Thus mucic ether may be obtained by this process, which will become perfectly white by crystallization, while by Malagutti's method, the product is quite black, and is purified with difficulty. One or other of the above plans may be adopted for the preparation of those ethers for which formulæ are not inserted in this volume.

ETHERIN. A name applied by some chemists to a hydrocarbon, assumed to be the base of ether. Its atomic constitution, according to this hypothesis, is 4 equivalents each of hydrogen and carbon.

ETHERINE. *Syn.* CAMPHOR OF OIL OF WINE. A peculiar substance obtained by exposing etherole for a long time to a low temperature. It forms brilliant prisms and plates, and is tasteless, soluble in alcohol and ether, fuses at 230°, boils at 500°, and is a little lighter than water. The crystals are purified by pressure between the folds of bibulous paper, solution in ether, and evaporation.

ETHEROLE. *Syn.* LIGHT OIL OF WINE. A hydrocarbon discovered by Hennel. It is prepared by gently heating ethereal oil with water, separating the supernatant light oil, and washing this with water till it becomes quite neutral, after which it is dried by means of chloride of calcium. Etherole is a colorless oily liquid, lighter than water, boiling at 536°, and soluble in absolute alcohol and ether.

ETHIOPS. (See ÆTHIOPS.)

ETHIOPS, MARTIAL. *Syn.* ÆTHIOPS MARTIALIS. Oxide of iron prepared by keeping iron filings under water, and occasionally shaking them. It must be washed with water, and dried as quickly as possible to prevent its rusting. It was formerly much esteemed as a tonic.

ETHIOP'S MINERAL, (TYSON'S.) *Prep.* Oxide of mercury, (prepared by decomposing calomel with an equivalent proportion of liquor of potassa, to which a little liquor of ammonia has been

the animal matter and an acid, from which it may be nearly purified by solution in liquid ammonia, and precipitations by acetic acid, mixed with alcohol. Cochenillin may also be prepared by evaporating a watery infusion of cochineal to the consistence of sirup, dissolving this in proof spirit, filtering, again evaporating, and dissolving the residuum in liquid ammonia as before. It is turned orange by acids, and violet by alkalis. It has been obtained under the form of reddish-purple crystalline grains.

COCKLE POWDER. Cockles pulped through a sieve, made into a paste with flour, and a little salt, and then rolled out into thin pieces and dried. It is next reduced to powder, sifted, and packed in well-corked bottles. *Use.* To make sauce, (about ½ oz. to ½ pint.)

COCOA. I. The roasted husks of the cacao, or chocolate bean, reduced to powder by grinding.

II. The cake left after expressing the oil from the beans.

COCOA, PATENT. The cacao nut roasted and ground, (including the husks.)

COCOA, FLAKED. Ground cocoa strongly compressed, and flaked with a sharp knife or machine.

COCOA, SOLUBLE. Cocoa ground to a very fine powder, and mixed with sugar. It is thus rendered miscible with boiling water.

Remarks. Cocoa forms a very wholesome beverage, especially for breakfast. Much of the cheap stuff sold under this name is very inferior, being made with damaged nuts that have been pressed for the oil, mixed with potato flour, mutton suet, &c. Trash of this kind is frequently ticketed in the shop windows of London at 6*d.* to 8*d.* a pound. (See CHOCOLATE.) The nut of the palma cocos is commonly confounded with that of the theobroma cacao. The latter is the small chocolate bean, while the former is the large nut, filled with a refreshing milky juice.

COD. This excellent fish is in season from the beginning of October to the end of April. It should be chosen by the redness of the gills, freshness of the eyes, and the whiteness and firmness of the flesh. The best fish are very thick about the neck. It is generally cooked by boiling, but is sometimes baked, or cut into slices and broiled or fried. Cod's head and shoulders, with oyster sauce, is a favorite dish. Shrimp and anchovy sauce are also good additions. The flesh of the cod is often split and dried, (dried cod,) or salted. The fish so largely imported from Newfoundland are cod, beheaded, split open, gutted and salted. They are caught by millions on the "Grand Bank." Cod-sounds are pickled in brine and also made into isinglass. The liver is boiled for its oil, and the spawn made into caviare.

CODEIA. *Syn.* CODEINE. An alkaloid discovered by Robiquet associated with morphia.

Prep. Dissolve commercial hydro-chlorate of morphia in water, precipitate with ammonia, evaporate and crystallize. The product is a double salt of morphia and codeine, and when digested with warm liquor of potassa gives up its morphia. It may be further purified by solution in ether, and by the addition of a little water and spontaneous evaporation may be obtained quite pure and in a crystalline state.

Prop. Soluble in alcohol, ether, and water. Its solution in the latter, by slow evaporation, yields large transparent octohedrons. With the acids it forms crystallizable salts. These possess the singular property of producing a general and violent itching of the surface of the body when administered internally. The same symptoms frequently follow the exhibition of opium and muriate of morphia, and are referred to the presence of a salt of codeia. (Gregory.) The commercial muriate frequently contains 3 to 4§ of codeia.

Char. and Tests. It is distinguished from *morphia* by not becoming blue on the addition of the sesquichloride of iron, nor turning red with nitric acid, and by not being precipitated by ammonia, when dissolved in muriatic acid and mixed with a large quantity of water. Unlike morphia, it is insoluble in liquor of potassa and is soluble in ether. The salts of codeia may also be known by tincture of galls throwing down a copious precipitate from their solutions, but this does not occur in the salts of morphia. It may be distinguished from meconine by its aqueous solution showing an alkaline reaction with test paper.

COFFEE. The berry of the coffæa Arabica. II. A decoction or infusion prepared therefrom.

Qual. Coffee promotes digestion and exhilarates the spirits, and when strong generally occasions watchfulness, but in some phlegmatic constitutions induces sleep. Drunk in moderation, especially if combined with sugar and milk, it is perhaps the most wholesome beverage known. The various qualities that have been ascribed to it by some persons, such as dispelling or causing flatulency, removing dizziness of the head, attenuating the blood, causing biliousness, &c., appear to be wholly imaginary. In a medical point of view it has been regarded as diuretic, sedative, and a corrector of opium. It should be given as medicine in a strong infusion, and is best cold. In spasmodic asthma it has been particularly serviceable; and it has been recommended in gangrene of the extremities arising from hard drinking. (See CAFFEIN.)

Pur. The most common adulteration of ground coffee is chicory, which is added not only to cheapen the article, but to improve the flavor of damaged or inferior berries. This adulteration may be readily detected by shaking a spoonful of the suspected coffee with a wine-glassful of water, when, if it be pure, it will swim and scarcely color the liquid, but if chicory be present, it will sink to the bottom, and the water will be tinged of a deep red. *Roasted corn* is another common adulteration. This may be detected by the cold decoction striking a blue color with tincture of iodine.

COFFEE CREAM. *Prep.* Add a teacupful of very clear strong coffee to 1 pint each of clarified calf's feet jelly and good cream; sweeten with lump sugar, give it one boil up, and pour it into shapes or glasses, when nearly cool. The calf's feet jelly should be thick enough to render the whole lightly solid but not stiff.

COFFEE DROPS. *Prep.* Make an infusion with 1 oz. of coffee, clarify it, and moisten 1 lb. of sugar therewith, in the way directed for confectionary drops.

COFFEE, ESSENCE OF. A concentrated infusion of coffee prepared by percolation, to which

tained by expression. The substances are first bruised in a marble mortar, or, on the large scale, in a mill, and immediately submitted to the press, to prevent them passing into the state of fermentation, which would injure the quality of the product. Fruits which contain highly-flavored seeds, or which have rinds containing essential oil, should be deprived of them before pressing. The subacid fruits should also be allowed to lie together for some days before being pressed, as the quantity and quality of the product are thereby increased. The fluid matter absorbed by the ingredients employed in the preparation of tinctures, infusions, decoctions, extracts, &c., is generally obtained by powerful pressure. Expression is also frequently employed for the purpose of obtaining solids in a state of purity, as in the expulsion of oleine from stearine, and water from the bicarbonate of soda. On the small scale, the common screw-press, or one of like construction, is usually employed; but the power thus obtained is insufficient to expel the *whole* of a fluid diffused through the pores of a solid. Hence has arisen the use of the hydraulic press, which is alone employed on the large scale. In all these cases, the substances are placed in bags made of hair-cloth, or coarse canvass, previously to their being submitted to pressure.

EXSICCATION. *Syn.* Exsiccatio, (*Lat.*, from *exsicco*, to dry up.) The evaporation of the aqueous portion of solid bodies. In Chemistry and Pharmacy, this term is commonly applied to the operation by which plants and chemical preparations are deprived of their humidity. This is done by exposure to the sun, a current of dry air, an atmosphere rendered artificially dry by sulphuric acid, or by the direct application of heat by means of a water-bath, a sand-bath, or a common fire.

EXTRACTS. *Syn.* Extraits, (*Fr.*) Extracten, (*Ger.*) Extracta, (*Lat.*, from *extraho*, to draw out.) In Chemistry, the residuum from the evaporation of aqueous decoctions, or infusions of vegetable matter. In Pharmacy, preparations obtained by evaporating the expressed juices, or the decoctions, infusions, or tinctures, of vegetable substances, until a mass, of a solid or semi-solid consistence, is formed. Extracts vary in their nature and composition with the substances from which they are prepared, and the fluids employed as solvents. When water is used for making the solution, the extract will usually consist of gum, starch, sugar, albumen, and saline and other matter, along with a peculiar vegetable principle, which, from its occurrence in most plants, has received the name of extractive. This substance was discovered by Fourcroy, and presumed by him to be the common basis of *all* extracts; but it has since been proved by Chevreul, and several other chemists, to be a heterogeneous compound, varying in composition with the plant from which it is extracted. This substance has a brown color, speedily putrefies, and becomes oxidized, and is rendered insoluble by long exposure to air, and by repeated solutions and evaporations. In its unaltered state it is soluble in water, and in alcohol, and is precipitated from its solutions by the acids and metallic oxides. With alumina it forms the basis of several brown dyes. In the preparation of the greater number of extracts, water is employed as the menstruum, and these preparations are called, by way of distinction, "*watery extracts.*" When spirit is employed as the solvent, the extract may contain most of the substances above enumerated, except gum, which is insoluble in strong spirit. Besides these, spirit dissolves out many substances which are either wholly or nearly insoluble in water, as resins, essential oils, and the proximate principles of vegetables. Extracts prepared with alcohol, either alone, or diluted with water, are termed "*spirituous extracts,*" and, with scarcely an exception, are considerably more powerful than the *aqueous extracts* of the same vegetables. In some cases, dilute acid, (the acetic,) or acidulated water, is employed as the menstruum, and such preparations are hence called "*acetic extracts.*" The extracts of aconite, hemlock, henbane, stramonium, and colchicum, as well as of all other plants containing alkaloids, possess greater activity when prepared with vinegar than with water. Thus, a quantity of either the alcoholic or acetic extract of colchicum, equal to the common dose of the *aqueous extract*, would most probably produce death. Still more active extracts may be obtained by a combination of the last two menstrua. According to Ferrari, plants treated with rectified spirit of wine, mixed with one-thirty-sixth part of pyroligneous (acetic) acid, yield extracts of remarkable activity. (Prov Med. Jour., 1843.) To the preceding may be added, that the term *simple* extract is applied to one prepared from a single plant, or vegetable substance, and the term *compound* extract to one prepared from *two* or *more* of such substances.

The above are the principal varieties of extracts employed in British Pharmacy, all of which are classed under the general head *Extracta*, (extracts,) in the London Pharmacopœia; but on the Continent, ether is sometimes used as the menstruum for the active principles of certain substances, as cantharides, cubebs, sem. cinæ, &c.

Of all the foreign Pharmacopœias, that of Baden is most prolific of extracts; its pages contain directions for 58 or 60 of these preparations, of which the following is a brief notice:—

I. Watery Extracts. *a.* (*By displacement with cold water.*) Ext. absinthii; cardui benedicti; centaurii min.; chamomillæ; chinæ fuscæ, (cinchonæ;) chinæ regiæ; dulcamaræ; fumariæ; gentianæ; glycyrrhizæ; graminis ord., (liquid and solid;) ligni campech.; marrubii alb.; millefolii; rhataniæ; rad. saponar; taraxaci, (ordinary and fluid;) tormentillæ; trifolii fibr.

β. (*By the ordinary method of maceration.*) Ext. aloes; myrrhæ; opii; scillæ, valerianæ; chinæ fuscæ.

II. Spirituous Extracts. *a.* (*Prepared with spirit of sp. gr.* 0·944, *by* 24 *hours' maceration, or by the method of displacement.*) Ext. cort. aurantii; angelicæ; rad. arnicæ; calami; calendulæ, (marygold;) cascarillæ; calumbæ; colocynth.; inulæ; hellebori nigri; levistici, (Lovage;) quassiæ; rhæi.

β. (*Prepared in a similar way to the last with spirit of sp. gr.* 0·841.) Ext. aconiti; belladonnæ; chelidonii maj., (great celandine;) conii mac.; digitalis; gratiolæ, (hedge hyssop;) hyoscyami; lactucæ virosæ; pulsatillæ, (Pasque flower;) herb. taxi baccatæ, (yew;) rad. artemisiæ, nucis vomicæ.

at a very low temperature, (in vacuo if possible,) until the mixture acquires the consistence of a sirup, paste, or candy. (The latter may be powdered.)

COFFEE, SUBSTITUTES FOR. These are numerous, but the principal are the following:

I. (*Rye coffee. Dillenius's ditto. Hunt's breakfast-powder.*) Rye, roasted along with a little butter, and ground to powder. A good substitute.

II. (*German coffee. Succory ditto. Chicory ditto.*) From succory, as above. *Used* either for or mixed with foreign coffee. The most common adulteration of the latter.

III. (*Rice coffee.*) From rice, as above. A good substitute.

IV. (*Currant coffee.*) From the seeds washed out of the cake left in making currant wine.

V. (*Gooseberry coffee.*) From gooseberry seeds, as the last.

VI. (*Holly coffee.*) From the berries.

VII. (*Egyptian coffee.*) From chickpeas.

VIII. (*Rosetta coffee.*) From fenugreek seeds moistened with lemon juice.

IX. (*Corsican coffee.*) From the seeds of the knee-holly.

X. (*Sassafras coffee.*) From the fruit or nut of the sassafras tree, or from the wood cut into chips. Very wholesome. Much recommended in skin diseases, &c.

XI. (*Raspings.*) The raspings of the crust of loaves, procured at the baker's. Equal to rye coffee.

XII. (*Beech-mast coffee.*) From beech-mast or nuts. Very wholesome.

XIII. (*Acorn coffee.*) From acorns, deprived of their shells, husked, dried, and roasted. A good substitute.

XIV. (*Beet-root coffee.*) From the yellow beet-root, sliced, dried in a kiln or oven, and ground with a little foreign coffee. A good substitute.

XV. (*Bean coffee.*) Horse-beans roasted along with a little honey or sugar. When removed from the fire, a small quantity of cassia-buds is frequently added, and the whole is stirred until cold. Said to be a good substitute.

XVI. (*Almond coffee.*) Rye or wheat roasted along with a few almonds. A very small quantity of cassia-buds improves it. A good substitute.

COINS, IMPRESSIONS FROM. A very easy and elegant way of taking the impressions of medals and coins, not generally known, is as follows: Melt a little isinglass glue with brandy, and pour it thinly over the medal, so as to cover its whole surface; let it remain on for a day or two, till it has thoroughly dried and hardened, and then take it off, when it will be fine, clear, and as hard as a piece of Muscovy glass, and will have a very elegant impression of the coin. It will also resist the effects of damp air, which occasions all other kinds of glue to soften and bend if not prepared in this way. (Shaw.) If the wrong side of the isinglass be breathed on, and gold-leaf applied, it will adhere, and be seen on the other side, producing a very pleasing effect. Isinglass glue, made with water alone, will do *nearly* as well as if brandy be used.

Remarks. Medals may also be copied by surrounding them with a hoop of paper, and pouring on them plaster of Paris (mixed with water to the consistence of cream) to the depth of about ¼ an inch. Melted wax, stearine, fusible metal, or any similar material, may be used in the same way. If it be desired to copy the metal in copper, a mould should be first formed in the above manner, and the metal deposited on its surface by the agency of electricity. (See ELECTROTYPE.)

COLCHICINE. *Syn.* COLCHICINA. COLCHIA. A peculiar principle discovered by Gieger and Hesse in the seeds of the colchicum autumnale, or common meadow saffron. It also exists in the cormi or bulbs.

Prep. Macerate the crushed seeds in boiling alcohol, add hydrate of magnesia to throw down the alkaloid, digest the precipitate in boiling alcohol, and filter. By cautious evaporation colchicine will be deposited. It may be purified by re-solution.

Prop., &c. Odorless; tastes bitter; forms salts with the acids. It is very poisonous. One-tenth of a grain, dissolved in spirit, killed a cat in 12 hours. It differs from veratrine in being soluble in water, crystalline, and the non-production of sneezing when applied to the nose. Strong oil of vitriol turns this alkaloid of a yellowish brown; nitric acid of a deep violet, passing into indigo blue, green, and yellow.

COLCHICUM, POWDER OF. I. (*Collier.*) Seeds of colchicum 2 grs.; rhubarb 6 grs.; magnesia 10 grs.; mix for 1 powder, to be taken every six hours in acute rheumatism, inflammatory gout, &c., washing it down with a glass of Seltzer water, during high febrile action only.

II. (*Collier.*) Seeds of colchicum 3 grs.; muriate of ammonia 5 grs.; for 1 powder. For checking a paroxysm of gout, but its use requires caution. "After all that has been said respecting colchicum in gout, and admitting that it rarely fails to allay pain and check a paroxysm, I would record my opinion that he who would wish to arrive at a good old age, should eschew it as an ordinary remedy, and consider that he is drawing on his constitution for a temporary relief, with a certainty of becoming prematurely bankrupt in his vital energies."

COINDET'S PILLS. *Prep.* Protiodide of mercury 1 gr.; extract of liquorice 20 grs.; mix, and divide into 8 pills. *Dose.* 2 to 4 twice or thrice daily, as an alterative in scrofulous tumors, ulcers, &c.

COLD. When the body of an animal is immersed in an atmosphere at a temperature below the healthy standard, a sensation of coldness is experienced, produced by the passage of the caloric or heat of the body into the colder medium. If this withdrawal of caloric exceed the quantity produced by the vital system, the temperature of the body decreases, until it sinks below the point at which the functions of life can be performed. This declination is gradual; the extreme sensation of coldness changes into a disinclination for voluntary motion; next comes on drowsiness, followed by numbness and insensibility. In this state, if the sufferer be not rescued, and remedial measures had recourse to, death must rapidly follow.

Prevention of the effects of excessive cold.—The extremities of the body first suffer from the action of cold, owing to the circulation of the blood being less vigorous in those parts; they should,

therefore, be properly protected from its action. Woollen stockings or socks, with good shoes or boots, should be worn on the feet, and the body should be clad in thick woollen fabrics, proportioned to the inclemency of the weather, and the habits of the wearer. The circulation of the blood should be promoted by active exercise, and any disposition to sleep shaken off by increased bodily exertion. If the situation be such that exercise cannot be had recourse to, drowsiness is more likely to be experienced, and must be warded off, if possible, by keeping the mind incessantly and actively engaged. The principal endeavor should be to keep the extremities warm, as, if this be accomplished, no danger need be feared. In travelling by coach or on horseback, recourse may be had to hay and straw, which may be thrown over the feet and legs, and will materially ward off the effects of the weather.

Remedial measures for asphyxia produced by intense cold.—The patient should be laid in a room remote from the fire, and bathed with cold salt and water, after which the body should be wiped dry, and friction applied by the hands of the attendants, (warmed;) as many operating at once as can conveniently do so. Gentle stimulants should be administered by the mouth, and the bowels excited by some mild stimulating clyster. The lungs should also be inflated. (See ASPHYXIA.) As soon as symptoms of returning animation are evinced, and the breathing and circulation restored, the patient should be laid in a bed between blankets, and a little wine and water administered, and perspiration promoted by heaping an ample quantity of clothing on the bed. Should the patient have suffered from hunger as well as cold, the appetite may be appeased by the administration of a limited quantity of light food, taking especial care to avoid excess, or any thing indigestible or exciting.

COLIC. (From κωλον, the colon, the supposed seat of the disease.) The colic or bellyache. This name is commonly given to all severe griping abdominal pains, whatever may be the cause. This disease has been distinguished by nosologists into several varieties, as follows:—

I. (*The spasmodic colic.*) This kind is marked by a fluctuating pain about the navel, which goes away and returns by starts, often leaving the patient for some time. The belly is usually soft, and the intestines may often be felt in lumps, which move about under the hand, or wholly vanish for a time. It is unaccompanied by flatulency. *The remedies* are, warm fomentations, warm clysters, and carminatives, accompanied by small doses of camphor and opium.

II. (*The stercoraceous colic.*) This is marked by severe griping pains and constipation of the bowels. *The remedies* are powerful cathartics, as full doses of calomel, aloes, colocynth, jalap, &c., followed by purgative salts, as sulphate of magnesia or soda.

III. (*Bilious colic.*) In this variety the pain is intermittent and transient, accompanied by constipation, nausea, and vomiting. The fæces, if any, are bilious, dark-colored, and offensive. *The remedies* are, a full dose of blue pill, calomel, colocynth, or aloes, followed by a sufficient quantity of epsom or glauber salts. Warm fomentations are also serviceable.

IV. (*Flatulent colic.*) Marked by constipation and the irregular distension of the bowels by gas, accompanied by a rumbling noise, &c. It is commonly produced by the use of flatulent vegetables and slops. *The remedies* are, a full dose of tincture of rhubarb combined with a few drops of essence of peppermint. If this does not afford relief, a pill made of 3 grs. of blue pill and 2 grs. of compound extract of colocynth, may be taken, washed down with a glass of any cordial water, as peppermint, cinnamon, or caraway. If the pain be extreme, warm fomentations to the belly, or a carminative clyster may be adopted.

V. (*Accidental colic.*) Produced by improper food and poisons. The treatment differs but little from the last variety.

VI. (*Colica pictonum. Devonshire colic. Plumber's do. Painter's do. Lead do.*) The dry bellyache. This species of colic is marked by obstinate costiveness, acrid bilious vomitings, violent pains about the region of the navel, convulsive spasms in the intestines, and a tendency to paralysis in the extremities. It is most prevalent in the cider counties, and among persons exposed to the fumes of lead. *The remedies* are the same as for the spasmodic variety. Should these fail, after the bowels have been thoroughly evacuated, small doses of camphor and opium may be administered. Mr. Benson, the managing director of the British Whitelead Works at Birmingham, strongly recommends the use of sulphuric acid; he says: "I met with a statement some time since that sulphuric lemonade has been successfully used at a white lead manufactory in France as a preventive of the injurious effects of white lead; and it occurred to me that by adding *sulphuric acid* to the treacle-beer then used by our people, its supposed efficacy might be tested. This idea was carried into effect in the summer of 1841, and the results have proved most gratifying, as, although during several weeks after the addition of the sulphuric acid to the treacle beverage, little advantage seemed to be derived, yet the cases of lead colic became gradually less frequent, and since October of that year, or during a period of fifteen months, not a single case of lead colic has occurred among the people." (Lancet.)

The following is Mr. Benson's form for his treacle or sulphuric beer:—Take of treacle 15 lbs.; bruised ginger ½ lb.; water 12 gallons; yeast 1 quart; bicarbonate of soda 1½ oz.; sulphuric acid (oil of vitriol) 1½ oz. by weight: boil the ginger in 2 gallons of water; add the treacle and the remainder of the water, hot; when nearly cold transfer it to a cask, and add the yeast to cause fermentation; when this has nearly ceased, add the sulphuric acid, previously diluted with eight times its quantity of water, and then add the bicarbonate of soda, dissolved in one quart of water. Close up the cask, and in three or four days the beer will be fit for use. As acetous fermentation speedily takes place, particularly in hot weather, new supplies should be prepared as required.

COLOCYNTHINE. *Syn.* COLOCYNTHITE. COLOCYNTHIUM. The purgative bitter principle of the colocynth.

Prep. Digest the aqueous extract or the pulp of colocynth in alcohol, filter and evaporate the tincture. The residuum is colocynthine combined with acetate of potassa. By agitation with a *little*

ater the latter is removed. It may be purified by re-solution in alcohol, and evaporation.

Prop. A yellowish brown translucent resinous substance, very soluble in alcohol, less so in ether, and only slightly so in water. It is intensely bitter, and acts as a drastic purgative.

COLORING. *Syn.* BREWER'S COLORING, BRANDY DO. SPIRIT DO. ESSENTIA BINA. CARAMEL. *Prep.* Melt brown sugar in an iron vessel over the fire, until it grows black and bitter, stirring it well all the time, then make it into a sirup with water.

Remarks. Some use lime-water to dissolve the burnt sugar. Care must be taken not to overburn it, as a greater quantity is thereby rendered insoluble. The heat should not exceed 430°, nor be less than 400°. The process for nice experiments is best conducted in a bath of melted tin, to which a little bismuth has been added to reduce its melting point to about 435°; a little powdered resin or charcoal, or a little oil being put upon the surface of the metal to prevent oxidizement.

COLORS, COMPOUND. (IN DYEING.) The mixture of BLUE and YELLOW dyes produces *green;* RED and BLUE, *violet, purple, lilacs, &c.;* RED and YELLOW, *orange, cinnamon, &c.;* RED, YELLOW, and BLUE, *olives;* RED and BLUES, or GREEN or BLACK, *browns* of all shades; BLACK mixed with other dyes produces various shades of *brown* and olive, and when pale it constitutes *gray,* either by itself or the addition of a faint blue.

COLOMBIUM. A rare metal, discovered by Mr. Hatchet in 1801, in a black mineral belonging to the British Museum. Supposed to have been brought from America, hence the name. (See TANTALUM.)

COLUMBIC ACID. The preceding metal exists in its ores in the form of an acid, united to iron, manganese, or yttria. From these it may be obtained by fusion with 3 or 4 parts of potash, solution in water, and precipitation with an acid. It falls as a white powder or hydrate.

CONCENTRATION. (IN CHEMISTRY.) The volatilization of part of a liquid in order to increase the strength of the remainder. The operation can only be performed on solutions of substances of greater fixity than the menstrua in which they are dissolved. Many of the liquid acids, solutions of the alkalis, &c., are concentrated by distilling *off* their water.

(IN PHARMACY.) The term "concentrated" is very commonly applied to any liquid preparation possessing more than the usual strength. Thus we have "*concentrated*" *infusions, decoctions, liquors, solutions, tinctures,* and *essences,* most of which are made of 8 times the common strength. This is generally effected by using 8 times the usual quantity of the ingredients, with a given portion of the menstruum, and operating by digestion or percolation; the latter being generally adopted when the articles are bulky. When the menstruum is water, a little spirit is added to make the product keep.

CONCRETE. (IN ARCHITECTURE.) A compact mass, composed of pebbles, lime, and sand, employed in the foundations of buildings. The best proportions are 60 parts of coarse pebbles, 25 of rough sand, and 15 of lime.

CONDIMENTS. Substances taken with the food, to improve its flavor, or to render it more wholesome or digestible. The principal condiments are common salt, vinegar, lemon juice, spices, aromatic herbs, oil, butter, sugar, honey, and sauces. Most of these, in moderation, promote the appetite and digestion, but their excessive use tends to injure the stomach, and vitiate the gastric juice.

CONFECTIONS. (IN PHARMACY.) Medicines, usually pulverulent, mixed up to the consistence of a paste with powdered sugar, sirup, or honey. In the "London Pharmacopœia," both conserves and electuaries are included under this head, though there appears to be some little distinction between them. As remedial agents, the officinal confections possess but little value, and are chiefly useful as vehicles for the administration of more active medicines. In making confections, the sugar requires the same attention as for sirups. They should be kept in stone jars, covered with writing paper, and placed in a cool and dry situation. Without this precaution, they are apt to mould on the top. All the dry ingredients employed in making confections should be reduced to a very fine powder, and passed through a sieve not coarser than 80 holes to the inch.

CONFECTION OF ALMONDS. *Prep.* (*Confectio Amygdalæ,* P. L.) Sweet almonds ℥viii; white sugar ℥iv; powdered gum arabic ℥j. Macerate the almonds in *cold* water, then remove the skins, and beat them with the other ingredients until reduced to a smooth confection.

Use. To prepare milk of almonds. A little of this paste or powder, triturated with a sufficient portion of water, and strained through a piece of calico, forms emulsion of almonds.

CONFECTION OF ALKERMES. *Prep.* White sugar 1 lb.; rose-water ¼ pint; clarified juice of alkermes 3 lbs.; oil cinnamon 10 or 12 drops. Mix. It was formerly a common practice to add a little gold-leaf, rubbed small, so as to float about in it; also musk and ambergris.

CONFECTION OF ALUM. *Prep.* (*Conf. Aluminis,* St. B. H.) Alum in fine powder, 80 grs.; conserve of roses, enough to mix. *Use.* As an astringent.

CONFECTION, AROMATIC. *Syn.* SIR WALTER RALEIGH'S CORDIAL. CONFECTIO RALEIGHANA, (P. L. 1720.) DITTO CARDIACA, (P. L. 1745.) DITTO AROMATICA, (P. L. 1788, and since.) *Prep.* I. (P. L.) Nutmegs, cinnamon, and hay saffron, of each ℥ij; cloves ℥j; cardamoms ℥ss; prepared chalk ℥xvj; white sugar lbs. ij. Reduce the whole to a very fine powder, and keep it in a closed vessel. When wanted for use, mix it with water to the consistence of a confection.

Remarks. On the large scale the above form is seldom adhered to. Less saffron is commonly used, cassia is substituted for cinnamon, and, generally, the essential oil for the powder of cloves. Should there be any deficiency of color, this is brought up by a little tincture or infusion of turmeric. When a very smooth and fine powder is desired, it should be passed through a gauze sieve, not coarser than 80 holes to the inch, and precipitated chalk should be employed. The saffron should be dried with as little heat as possible, and care should be taken not to waste any in powdering. The following formula, which is employed by a large whole-

sale druggist in the city, produces an excellent article.

II. Hay saffron, cassia, and turmeric, of each 4 oz.; cardamoms 1 oz.; starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oil of nutmegs 2 drachms; oil of cloves 3 drachms. Reduce the dry ingredients to fine powder, and pass it through an 80 hole sieve, then add the oils, and after well mixing, pass it through a coarse sieve, (about 40 holes to the inch,) to ensure the whole being perfectly mixed.

The following form produces a powder possessing great depth and brilliancy of color.

III. Hay saffron 4 oz.; turmeric 3 oz.; powdered starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oils of cloves and cassia, of each 3 drachms; oil of nutmegs 2 drachms; essence of cardamoms 1 oz. *Proc.* Boil the saffron and turmeric in 1 gallon of water, placed in a bright copper pan, for 10 minutes, then, without straining, add the chalk, starch, and sugar; mix well, and continue stirring until the mixture becomes quite stiff, then break it up and dry it until fit for powdering. This must be performed in a water or steam bath. To the powder, passed through a fine sieve, as before, the oils and tincture must be added, and after being well mixed, and passed through a coarse sieve, it should be placed in a jar or bottle, and bunged up close.

Remarks. In the wholesale trade this article is kept under two forms: one in powder, as ordered by the College, and commonly called, for distinction sake, "*pulvis confectionis aromaticæ;*" the other mixed up ready for use. In preparing the latter, it is a common plan to make a strong infusion or decoction of the saffron, and to use it to mix up the other ingredients. Some persons follow the method described in the last formula, mixing up the powder to a proper consistence with water before adding the aromatics. When the price of *precipitated* chalk is an objection to its use, *prepared* chalk may be used instead. This confection is cordial, stimulant, and antacid. *Dose.* 10 to 60 grs.

CONFECTION OF BLACK PEPPER. *Syn.* WARD'S PASTE. *Prep.* (*Confectio Piperis Nigri*, P. L.) Black pepper and elecampane root, of each lb. j; fennel seed lb. iij; honey and white sugar, of each lb. ij; mix.

Remarks. The common practice is to keep the dry ingredients ready mixed in a bottle, and only to add the honey as wanted. The proportions are 2 parts of the latter to 7 of the mixture. The *dose* is 1 to 2 drachms 2 or 3 times a-day, in piles, fistula, &c. It should be persevered in for 2, 3, or 4 months, (Sir B. Brodie;) and as it is apt to accumulate in the bowels, its use should be accompanied by mild aperients. (Pereira.)

CONFECTIONS OF CASSIA. *Syn.* ELECTUARIUM CASSIÆ, (P. L. 1788.) *Prep.* (*Confectio Cassiæ*, P. L.) Fresh cassia pulp lb. ss.; manna ℥ij; tamarind pulp ℥j; sirup of roses f℥viij. Bruise the manna and dissolve it in the sirup, then add the pulps and evaporate to a proper consistence.

CONFECTION OF HEMLOCK. (Dr. Osborne.) *Prep.* Fresh leaves of hemlock and moist sugar equal parts; beat them to a confection in a mortar.

CONFECTION OF OPIUM. *Syn.* PHILONIUM ROMANUM, (P. L. 1720.) DITTO LONDINENSE, (P. L. 1745.) CONFECTIO OPIATA, (P. L. 1788.) DITTO OPII, (P. L. 1809, and since.) *Prep.* (P. L.) Powdered opium ʒvj; long pepper ℥j; ginger ℥ij; caraways ℥iij; tragacanth ʒij; all in fine powder; sirup f℥xvj. Mix.

Use and Dose. This confection is intended as a substitute for the *mithridate* and *theriaca* of the old Pharmacopœia. It is stimulant and narcotic, and is given in flatulent colic and diarrhœa unaccompanied by fever. The dose is from 15 to 50 grs.

CONFECTION OF ORANGE PEEL. *Syn.* CONSERVA FLAVEDINIS CORTICUM AURANTIORUM, (P. L. 1720 and 1745.) DITTO CORTICIS EXTERIORIS AURANTII HISPALENSIS, (P. L. 1788.) DITTO AURANTIORUM, (P. L. 1824.) DITTO AURANTII, (P. L. 1809 and 1836.) *Prep.* (P. L.) The external rind of the fresh orange, separated by rasping, lb. j; white sugar lb. iij. Beat the rind in a stone mortar with a wooden pestle, then add the powdered sugar, and beat the mixture until the two are perfectly incorporated.

Remarks. This confection is tonic and stomachic, and is principally used as a vehicle for the exhibition of tonic powders.

CONFECTION OF PEPPERMINT. *Prep.* Green peppermint 4 oz.; powdered white sugar 12 oz.; beat them together as last.

Use. Anti-emetic and flatulent. Given in colic, &c., in the form of a bolus, or made into a mixture.

CONFECTION OF THE DOG ROSE. *Syn.* CONFECTION OF HIPS. CONSERVA FRUCTUS CYNOSBATI, (P. L. 1720 and 1745.) DITTO CYNOSBATI, (P. L. 1788.) DITTO ROSÆ CANINÆ, (P. L. 1809, and since.) *Prep.* (P. L.) Pulp of the dog rose lb. j; powdered refined sugar ℥xx; mix by a gentle heat in an earthen vessel.

II. Pulped hips 2 cwt.; fine white sugar 2½ cwt.; incorporate them without applying heat.

Remarks. Both this and the following confection has a brighter color, if made without heat, or touching metallic vessels. On the small scale it is made by beating the ingredients together in a marble mortar, but in large quantities by grinding in a mill. It is slightly laxative, and is principally used for forming pills. It candies by keeping.

CONFECTION OF THE RED ROSE. *Syn.* CONSERVA ROSARUM RUBRARUM, (P. L. 1745.) DITTO ROSÆ, (P. L. 1788.) DITTO ROSÆ GALLICÆ, (P. L. 1809 and 1824.) CONFECTIO ROSÆ GALLICÆ, (P. L. 1836.) *Prep.* (P. L.) Petals of the red rose lb. j; refined sugar lb. iij; beat the petals in a stone mortar, then add the sugar, and again beat until thoroughly incorporated.

Remarks. On the large scale this is prepared like the confection of hips. It is astringent and tonic, and principally used for forming pills. If taken alone, the dose is 1 to 2 drachms.

CONFECTION OF RUE. *Syn.* ELECTUARIUM E BOCCIS LAURI, (P. L. 1720, 1745.) CONFECTIO RUTÆ, (P. L. 1809, and since.) *Prep.* (P. L.) Dried rue, caraway, and laurel berries, of each ℥iss; sagapenum (true) ℥ss; black pepper ʒij; honey ℥xvj. Reduce the dry ingredients to very fine powder, and when wanted for use, make them into a confection with the honey.

Use, &c. It is antispasmodic; in enemas 30 to

60 grs., with half a pint of gruel, for flatulent colic, &c.

CONFECTION OF SCAMMONY. *Syn.* ELECTUARIUM CARYOCOSTINUM, (P. L. 1720.) DITTO E SCAMMONIO, (P L. 1745.) DITTO SCAMMONII, (P. L. 1809 and 1788.) CONFECTIO SCAMMONEÆ, (P. L. 1809 and 1824.) *Prep.* (*Confectio Scammonii* P. L.) Scammony ℥iss; cloves and ginger, of each, ʒvj; oil of caraway fʒss. Reduce the ingredients to a very fine powder, and when wanted for use, make them into a confection with sirup of roses, and lastly add the oil.

Use, &c. Cathartic in doses of 10 to 30 grs.

CONFECTION OF SENNA. *Syn.* LENITIVE ELECTUARY. ELECTUARIUM SENNÆ, (P. L. 1788.) CONFECTIO SENNA, (P. L. 1809, and since.) *Prep.* (P. L.) Senna ℥viij; figs lb. j; pulp of tamarinds, prunes, and cassia, of each, lb. ss.; coriander seeds ℥iv; liquorice ℥iij; sugar lb. iiss; water 3 pints. *Proc.* Rub the senna and corianders in a mortar, and separate by sifting ℥x of the mixed powders. Boil the figs and liquorice in the water, until reduced to one half; then press and strain the liquor. Evaporate the strained liquor until only 24 fluid ounces remain, then add the sugar, and when dissolved, mix in the pulps, and lastly the powder.

Use, Dose, &c. Confection of senna is a gentle and pleasant purgative, and well adapted for persons suffering from piles, and as a laxative during pregnancy. The dose is ¼ to ½ oz. taken at bedtime or early in the morning.

Remarks. Perhaps there is no one pharmacopœial preparation which it is more difficult to obtain of good quality than the above. The absolute cost of an article prepared according to the directions of the College, will be somewhere about 1*s.* 9*d.* per lb.; but there are many wholesale drug houses vending confection of senna, which they warrant as genuine, at from 9*d.* to 1*s.* a pound. Dr. Paris (in his Pharmacologia) very truly remarks, that "the directions of the Pharmacopœia are very rarely followed." I understand that considerable quantities are manufactured, into which unsound and spoiled apples enter as a principal ingredient. The following forms are, to my knowledge, employed by some members of the trade.

II. Powdered senna, pulp of tamarinds, cassia, and prunes, of each, 1½ lb.; powdered corianders ¾ lb.; Spanish juice ½ lb.; simple sirup 12 lbs.

III. As the above, omitting the cassia pulp, and adding 2 lbs. more tamarind pulp.

Both these articles are labelled P. L., and sent out as genuine, and that when no competition as to price exists. The cheaper article is made as follows:

IV. Common prunes and tamarinds, of each, 16 lbs.; treacle ¾ cwt.; species (a compound of senna dust and small senna, mixed with 3 lbs. of coriander seeds, and strengthened with jalap, all ground to a fine powder) 18¼ lbs. To this is frequently added ¼ cwt. of rotten or inferior apples, which are pulped with the prunes and tamarinds. This article is not unfrequently labelled "CONF. SENNÆ VER." by the conscientious tradesman.

CONFECTION OF SULPHUR, (COMPOUND.) *Prep.* (St. B. H.) Precipitated sulphur ℥ss; cream of tartar ʒj; honey ℥j; mix As a laxative in piles, &c. *Dose.* ℥ss.

CONFECTION OF STEEL. *Syn.* CONFECTION OF CARBONATE OF IRON. *Prep.* Confection of orange-peel and sesquioxide of iron, (P. L.,) of each, 4 oz.; powdered white sugar 6 oz.; simple sirup 2 oz.; mix. Aromatic and tonic. *Dose.* A teaspoonful to ½ oz. twice or thrice daily.

CONGELATION, (from *congelo*, to freeze.) IN CHEMISTRY. The conversion of a liquid into a solid state, by the action of cold.

The production of an extreme degree of cold is often of the utmost importance in chemical operations, and an easy method of doing so is consequently a desideratum. The means hitherto adopted for this purpose have either depended upon the sudden liquefaction of solids, or the abstraction of heat by rapid evaporation. The loss of sensible heat, by the first method, is the basis of the various processes of producing cold by what are commonly called freezing mixtures, all of which act upon the principle of liquefying solid substances without supplying heat. The caloric of liquidity being in these cases derived from that previously existing in the solid itself in a sensible state, the temperature must necessarily fall. The degree of cold produced, depends upon the quantity of heat which is thus diffused through a larger mass, or which, as it were, disappears, and this is dependent on the quantity of solid matter liquefied, and the rapidity of the liquefaction. Saline compounds are the substances most frequently employed, and those which have the greatest affinity for water, and thus liquefy the most rapidly, produce the greatest degree of cold. Thus it is, that chloride of calcium and nitrate of ammonia, when dry and in fine powder, if suddenly mixed with water, produce extreme cold. The latter, suddenly mixed with an equal weight of water at 50°, will sink the thermometer to +4°, or 28° below the freezing point. The most common and convenient freezing mixture, when snow can be procured, is formed by mixing 2 parts of that substance with 1 part of sea-salt. This will sink the thermometer to −5°, or 37° below the freezing point of water. Equal parts of these substances produce a degree of cold marked by the zero of Fahrenheit's thermometer, and is the standard taken for graduating that instrument. Mr. Walker, a gentleman who fully investigated this subject, recommends the following proportions for the production of extreme cold.

TABLES *exhibiting a collective View of all the* Frigorific Mixtures *contained in* Mr. Walker's *Publication,* 1808.

Table I. Consisting of Frigorific Mixtures, composed of Ice, with Chemical Salts and Acids.

Mixtures	Thermometer sinks.	Degree of cold produced.
Snow or pounded ice . . . 2 parts Muriate of soda . . 1 "	From any temperature to —5°	*
Snow or pounded ice . . 5 " Muriate of soda . . 2 " Muriate of ammonia . 1 "	From any temperature to —12°	*
Snow or pounded ice . . 24 " Muriate of soda . . . 10 " Muriate of ammonia . 5 " Nitrate of potash . . . . 5 "	From any temperature to —18°	*
Snow or pounded ice 12 " Muriate of soda . . . 5 " Nitrate of ammonia . . 5 "	From any temperature to —25°	*
Snow . . . . 3 " Diluted sulphuric acid† . . 2 "	From +32° to —23°	55°
Snow . . . . 8 " Muriatic acid (concentrated) . 5 "	From +32° to —27°	59
Snow . . . . 7 " Concentrated nitrous acid . 4 "	From +32° to —30°	62
Snow . . . . 4 " Muriate of lime . . . . 5 "	From +32° to —40°	72
Snow . . . . 2 " Crystallized muriate of lime . 3 "	From +32° to —50°	82
Snow . . . . 3 " Potash . . . . . . 4 "	From +32° to —51°	83

N. B. The reason for the omissions in the last column of this table is, the thermometer sinking in these mixtures to the degree mentioned in the preceding column, and never lower, whatever may be the temperature of the materials at mixing.

Table II. Consisting of Frigorific Mixtures, having the power of generating or creating Cold, without the aid of Ice, sufficient for all useful and philosophical purposes, in any part of the world at any season.

Mixtures.	Thermometer sinks.	Degree of cold produced.
Muriate of ammonia . . . 5 parts Nitrate of potash . . . . 5 " Water . . . . . 16 "	From +50° to +10°	40°
Muriate of ammonia . . 5 " Nitrate of potash . . . . 5 " Sulphate of soda . 8 " Water . . 16 "	From +50° to +4°	46
Nitrate of ammonia . . 1 " Water . . . . . . 1 "	From +50° to +4°	46
Nitrate of ammonia . . . 1 " Carbonate of soda . . 1 " Water . . . . 1 "	From +50° to —7°	57
Sulphate of soda . . 3 " Diluted nitrous acid‡ . 2 "	From +50° to —3°	53
Sulphate of soda . . . 6 " Muriate of ammonia 4 " Nitrate of potash . . . 2 " Diluted nitrous acid . . . 4 "	From +50° to —10°	[illegible]

† Strong acid 2 parts; water or snow 1 part, by weight.
‡ Fuming nitrous acid 2 parts; water 1 part, by weight.

Table II. continued.

Mixtures.		Thermometer sinks.	Degree of cold produced.
Sulphate of soda . . . . . Nitrate of ammonia . . . . Diluted nitrous acid	6 parts 5 " 4 "	From +50° to —14°	64°
Phosphate of soda . . . . Diluted nitrous acid	9 " 4 "	From +50° to —12°	62
Phosphate of soda . . . . Nitrate of ammonia . . . . Diluted nitrous acid	9 " 6 " 4 "	From +50° to —21°	71
Sulphate of soda . . . . . Muriatic acid	8 " 5 "	From +50° to 0°	50
Sulphate of soda . . . . . Diluted sulphuric acid* . . .	5 " 4 "	From +50° to +3°	47

N. B. If the materials are mixed at a warmer temperature than that expressed in the Table, the effect will be proportionately greater; thus, if the most powerful of these mixtures be made when the air is +85°, it will sink the thermometer to +2°.

TABLE III. Consisting of Frigorific Mixtures selected from the foregoing Tables, and combined so as to increase or extend Cold to the extremest Degrees.

Mixtures.		Thermometer sinks.	Degree of cold produced.
Phosphate of soda . . . . Nitrate of ammonia . . . . Diluted nitrous acid	5 parts 3 " 4 "	From 0° to —34°	34°
Phosphate of soda . . . . Nitrate of ammonia . . . . Diluted mixed acids	3 " 2 " 4 "	From —34° to —50°	16
Snow . . . . Diluted nitrous acid	3 " 2 "	From 0° to —46°	46
Snow . . . . Diluted sulphuric acid . . . Diluted nitrous acid	8 " 3 " 3 "	From —10° to —56°	46
Snow . . . . Diluted sulphuric acid	1 " 1 "	From —20° to —60°	40
Snow . . . . Muriate of lime	3 " 4 "	From +20° to —48°	68
Snow . . . . Muriate of lime . .	3 " 4 "	From +10° to —54°	64
Snow . . . . Muriate of lime . . .	2 " 3 "	From —15° to —68°	53
Snow . . . . Crystallized muriate of lime . .	1 " 2 "	From 0° to —66°	66
Snow . . . . Crystallized muriate of lime . .	1 " 3 "	From —40° to —73°	33
Snow . . . . Diluted sulphuric acid . . .	8 " 10 "	From —68° to —91°	23

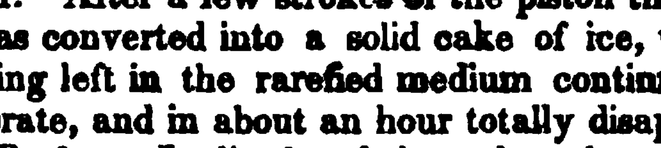
Remarks. The above artificial processes for the production of cold are more effective when the ingredients are first cooled by immersion in other freezing mixtures. In this way Mr. Walker succeeded in producing a cold equal to 100° below the zero of Fahrenheit, or 132° below the freezing point of water.

The materials in the first column are to be cooled, previously to mixing, to the temperature required, by mixtures taken from either of the preceding tables.

* Equal weights of strong acid and water.

II. (*By evaporation.*) When heat passes from the sensible to the insensible state, as in the formation of vapor, cold is generated. This may be illustrated by pouring a few drops of ether, or highly rectified alcohol, on the palm of the hand, when a strong sensation of cold will be produced. In like manner, if the bulb of a thermometer be covered with lint, and the latter moistened with ether, the quicksilver will rapidly fall. Even in hot climates water is frozen by the joint operation of evaporation and radiation. The natives of India procure ice when the temperature of the air much exceeds the freezing point. On the open plains, near Calcutta, this is effected by exposing a thin stratum of water to the atmosphere, during the fine clear nights of December, January, and February. The pans are made of porous earthenware, and water is poured in to the depth of about $1\frac{1}{2}$ inches. A large number of vessels of this kind are arranged in an excavation in the ground, 30 or 40 feet square and 2 feet deep, the bottom of which is covered, to the depth of 10 or 12 inches, with sugar canes or the stalks of Indian corn. At sunrise the pans are visited, the ice separated from the water, and packed as tight as possible in a deep cavity or pit, well screened from the heat.

It has been found that evaporation proceeds much more rapidly from the surface of fluids in a vacuum than in the atmosphere. Dr. Cullen was the first person to apply this practically. In 1755 he plunged a vial of ether into a tumbler of water, and on placing it under a receiver and exhausting the air, the ether boiled and the water was speedily frozen. In 1777, Mr. Nairne published his method of rendering the rarefied atmosphere of an exhausted receiver free from aqueous vapor by means of sulphuric acid. By the application of this discovery, Professor Leslie in 1810 succeeded in freezing water with great ease. This he effected by introducing a surface of sulphuric acid under the receiver of an air-pump, over which he placed a watch-glass filled with water, so that the vapor arising from the latter was rapidly absorbed by the former. After a few strokes of the piston the water was converted into a solid cake of ice, which on being left in the rarefied medium continued to evaporate, and in about an hour totally disappeared. Professor Leslie found that when the air was rarefied 250 times, the surface of evaporation was cooled down 120° in winter, and when only 50 times, a depression of 80° or even 100° took place. A pleasing philosophical toy, illustrative of the evaporative power of a vacuum, is the Cryophorus, or frost-bearer of Dr. Wollaston. This instrument consists of two small glass globes united by a tube, one of which is partly filled with water, but the apparatus is perfectly free from air.



The part of the apparatus unoccupied by the water, though apparently empty, is in reality filled with aqueous vapor, and thus checks evaporation by its pressure on the surface of the water. No sooner is the pressure removed, as by plunging the empty ball into a freezing mixture, (which condenses the vapor,) than rapid evaporation commences, and the water in the other ball is frozen in two or three minutes.

To succeed well in the production of cold in this way, it is necessary that the surfaces of the two fluids should be pretty near together, and that the acid should have the greater amount of surface of the two. The acid should be poured to the depth of $\frac{1}{2}$ an inch into a broad shallow dish or capsule, and the water into another vessel of a similar kind, but having only half the diameter of the former, and proportionally shallow. The smaller capsule may be supported over the surface of the larger one by means of 3 slender feet. As soon as the acid has acquired one-tenth of its weight of water, its absorbent power is diminished $\frac{1}{100}$; when this dilution reaches $\frac{1}{4}$ the reduction is $\frac{1}{25}$, and when it reaches $\frac{1}{2}$ the cooling power has diminished about 50%. "Sulphuric acid is capable of congealing more than 20 times its weight of water before it has imbibed nearly its own bulk of that liquid, or has lost about $\frac{1}{8}$ of its refrigerating power." (Ure.) Sulphuric acid, which has become diluted in this way, may be reconcentrated by heat.

It has been discovered that oatmeal, dried nearly to brownness before a common fire, and cooled in close vessels, may be substituted for sulphuric acid. With a quantity of this substance, one foot diameter, and 1 inch deep, Professor Leslie froze 1 imperial pint of water, contained in a hemispherical porous cup. Ignited chloride of calcium, in porous pieces, has also been successfully used for the same purpose. Dr. Ure has found that a requisite vacuum may be produced by the agency of steam, in the following manner, without the use of an air-pump: "A cast-iron drum of considerable dimensions being filled with steam by heating a small quantity of water in it, will sufficiently expel the air. When it is cooled by the affusion of water, a transferrer plate being attached to the stopcock on its upper surface would easily enable us, without any air-pump, to effect congelation by means of sulphuric acid in the attenuated atmosphere. Suppose the capacity of the receiver to be one-sixtieth of the iron cylinder, an aëriform rarefaction to this degree would be effected in a moment by a turn of the stopcock; and, on its being returned, the moisture below would be cut off, and the acid would speedily condense the small quantity of vapor which had ascended."

Many curious experiments may be performed over sulphuric acid, in the receiver of an air-pump, among which one of the most instructive and amusing is the congelation of quicksilver, a metal which requires, for this purpose, a temperature of 39° below zero, or 71° below the freezing point of water. This is readily effected by suspending the metal in a capsule of ice by means of threads, near to the surface of the sulphuric acid, and urging the rarefaction as much as possible. Mercury so frozen may be kept in the solid state for several hours.

The processes of congelation above detailed admit of being applied to several useful purposes, especially in domestic economy, and the arts of the cook and confectioner, as in the making of ices, &c.

CONGREVE MATCHES. I. (*Process of M. Jeblonouski.*) Put phosphorus 40 grammes into a wide-mouthed vial, with enough oil of turpentine to cover it, add flowers of sulphur 10 gr.,

and put the vial into hot water, (using great caution,) until the phosphorus is melted. Then cork close and agitate until cold, when any supernatant spirits of turpentine must be poured off. Into this pulpy mass the extremities of the matches are dipped, and when they have become *rather* dry, they are again dipped into the following mixture: Gum arabic 30 grammes, (dissolved in a little water;) chlorate of potassa 20 grammes; soot, or vermilion, (rubbed up with a few drops of alcohol,) 10 gr.; mix, and dip the tips of the matches therein as before, then dry them cautiously in a warm apartment. These matches inflame without fulmination (noise) on being rubbed against any rough surface.

II. (*Joblonouski.*) Chlorate of potassa 2 parts; phosphorus 4 parts; gum arabic 7 parts; gelatin 2 parts. *Proc.* The phosphorus is divided in the gum brought to the state of thick mucilage, and warmed; the gelatin is melted and added to the phosphoreted mucilage. The chlorate of potassa is bruised in a mortar, and at the same time moistened with the mucilage. When it is bruised the whole is mixed together, and a paste is obtained, with which matches, tipped with sulphur, may be embued. They are then dried in the air.

III. (*Process of Dr. R. Boettger.*) Gum arabic and vermilion, of each 16 parts; phosphorus 9 parts; saltpetre 14 parts. *Proc.* The phosphorus must be reduced to a state of fine division, by agitating it with fresh urine, or, still better, a solution of pure urea, which, in consequence of the discovery by Liebig, of a process of preparing that substance artificially, may now be easily procured or made. Hot water must be employed to melt the phosphorus, and this part of the process is similar to that previously detailed. The minutely divided phosphorus thus formed, is mixed with the other articles made into a paste, with the gum dissolved in the least quantity of water, and the matches dipped into the mingled ingredients and dried. They are then dipped into a dilute varnish of copal, or a thin solution of gum arabic containing saltpetre, and again dried. (Boettger's Beitrage.) These matches are very superior, and explode without noise.

Remarks. The matches formerly made, exploded with a crackling noise, and frequently threw out small sparks of fire, which rendered them dangerous. This arose from their containing too large a quantity of chlorate of potassa. An opposite plan is now generally followed, and a less proportion of the chlorate is used, or instead thereof saltpetre. The quantity of the igniting ingredients has also been greatly lessened, so as to avoid any danger on that account. This plan answers very well, when the body of the matches, whether of wood or pasteboard, is properly prepared; but if this be not the case, frequent disappointment will occur, from their going out again immediately after inflaming. To prevent this, the matches should be dipped into sulphur previously to coating them with the composition, unless intended for cigar fusees, when they should be prepared by soaking them in water holding some saltpetre, bichromate of potash, or acetate of lead in solution, preference being usually given to the first of these articles. Different coloring substances are employed to tint the composition, according to the fancy of the manufacturer, as smalts, red lead, vermilion, black oxide of manganese, soot, &c. A very elegant method of reducing phosphorus to a state of minute division, is to melt it in rectified spirit, and agitate until cold, as above.

The manufacture and sale of matches, containing sulphur and phosphorus, as in the first formula, have been forbidden in Paris, in consequence of the extreme facility with which they ignite, having led to several accidents. (See CHLORATE MATCHES, and LUCIFERS.)

CONIA. *Syn.* CONEINE. CONICIN. CICUTINE, &c. A poisonous alkaloid, discovered by Giesecke in hemlock.

Prep. Distil the seeds of hemlock, or their alcoholic extract, with water and potassa. During this process, the conia passes over into the receiver and floats upon the top of the water, which also contains a little conia in solution. It must be purified in the way directed for the volatile bases. (See ALKALOID.) If the alcoholic extract be employed, about ½ its weight of potassa should be used.

Remarks. 6 lbs. of fresh and 9 lbs. of dried seeds yielded 1 oz. of conia. (Gieger.) 40 lbs. of the ripe but green seeds yielded 2½ oz. of hydrated conia. (Christison.) It is remarkably poisonous. One drop, placed in the eye of a rabbit, killed it in 9 minutes. Five drops, poured into the throat of a dog, killed it in less than a minute. It has been employed in some convulsive and spasmodic diseases. "The plaintive cries, the contortions, and the rigidity of the limbs, which have always preceded death, (caused by conia,) leave no doubt as to the cruel pains which this kind of poisoning brings on." (Boutron-Chalard and Henry.)

CONSERVES. (From *conservo*, to keep.) In pharmacy, a composition of some recent vegetable matter and sugar, beat together to the consistence of a paste. The object aimed at in the preparation of conserves, is to preserve the properties of the active ingredient, which would otherwise be liable to change. In the last edition of the London Pharmacopœia, conserves, as well as electuaries, are included under the head of confections. The term confection appears, however, less appropriate to some of them, than the word conserve or electuary. The word confection has a more general application, and implies any sweetmeat or composition, in which sugar is the principal ingredient.

CONSERVE OF ALMONDS. (CONSERVA AMYGDALARUM, P. D.) Confection of almonds.

CONSERVE, ANTISCORBUTIC. (CONSERVA ANTISCORBUTICA. Selle.) Horseradish, water-cress, water-trefoil, radish juice, and orange juice, of each equal parts; white sugar enough to make a confection.

CONSERVE OF ARUM. (WAKEROBIN.) *Prep.* Fresh arum roots ½ lb.; white sugar 1½ lb.; beat together. Diuretic and attenuant.

CONSERVE OF LAVENDER. *Prep.* Lavender flowers 1 part; lump sugar 3 parts; beat together.

Remarks. In a similar way conserves are made from various other leaves and flowers; but mostly with only twice their weight of sugar. The above is frequently used to sweeten the breath.

CONSERVE OF LEMON-PEEL. *Prep* Rasp off the external rind of the lemon, and beat

it in a mortar with three times its weight of powdered white sugar. (See CONFECTION OF ORANGE-PEEL.) Tonic and stomachic.

CONSERVE OF ORANGE-PEEL. (CONSERVA AURANTII, P. E.) The same as the confection of orange-peel, P. L.

CONSERVE OF RED ROSES. (CONSERVA ROSÆ, P. E. and D.) That of the Dublin Pharmacopœia is the same as the confection of roses, P. L.; that of the Edinburgh has only 2 lbs. of sugar to 1 lb. of rose petals.

CONSERVE OF ROSEMARY. *Prep.* 1 part of the leaves or tops, beaten up with 3 parts of sugar.

CONSERVE OF SCURVY GRASS. *Syn.* CONSERVA COCHLEARIÆ HORTENSIS. *Prep.* Beat 1 lb. of the leaves with 3 lbs. of lump sugar. Stimulant and antiscorbutic.

CONSERVE OF SLOES. *Syn.* CONSERVA PRUNI SYLVESTRIS, (P. L. 1788.) Pulp of sloes 1 part; sugar 3 parts; mix.

CONSERVE OF SQUILLS. *Syn.* CONSERVA SCILLÆ, (P. L. 1788.) Fresh squills ℥j; white sugar ℥v; mix. Diuretic; attenuant.

CONSERVE OF TAMARINDS. *Syn.* CONSERVA TAMARINDORUM. *Prep.* (P. Cod.) Pulp of tamarinds 4 oz.; white sugar 6 oz.; heat by a water-bath in an earthen vessel, until mixed and of a due consistence.

CONSERVE OF WORMWOOD. *Syn.* CONSERVA ABSINTHII MARITIMI, (P. L. 1788.) *Prep.* Beat fresh-picked leaves of sea wormwood in a marble mortar, with a wooden pestle, first alone, and then with 3 times their weight of refined sugar.

CONSTIPATION, (OF THE BOWELS.) Costiveness. When this is merely accidental or occasional, a dose of some cathartic is the only treatment necessary, but when it is *habitual*, it calls for further attention. The common causes of constipation are—The use of bread containing alum, and water containing lime; and the want of sufficient exercise. The treatment should consist in adopting a diet free from astringents, and consisting of a large portion of green vegetables and ripe fruit. Brown bread is frequently eaten for this purpose, and acts by the laxative nature of the bran it contains. The *occasional* use of laxative and emollient enemata may be had recourse to, but their habitual administration, as well as that of purgative medicines, by the mouth, is not to be recommended. The bowels, accustomed to the continual use of stimulants, act but languidly, or scarcely at all, without their application. In females, especially of the higher classes, the want of proper exercise is generally the chief cause of constipation. With such persons, a short walk two or three times daily will often do wonders, particularly if a little ripe fruit, a few raisins or tamarinds, or 2 or 3 drum figs, be occasionally eaten.

COPAIBA. *Syn.* CAPIVI. BALSAM OF CAPIVI. The best copaiba is that imported from Maracaibo and St. Martha, and is packed in casks containing from 1 to 1½ cwt. each, in large bottles, or in cylindrical tin boxes. Considerable variation exists in the color, consistence, and sp. gr., as well as in the proportion of oil and resin yielded by different samples, scarcely any two of which exactly agree. Even the odor, taste, and transparency vary considerably. Brazilian capivi is thin, clear, and pale; while the West Indian is thick, golden yellow, less transparent, and has a less agreeable and somewhat terebinthinate smell. Some varieties are opaque, and continue so, unless filtered. This is a most troublesome operation, unless well managed, and without proper precautions, frequently proves useless. The opacity generally arises from the presence of water, which is frequently found mixed with copaiba when first imported. This it retains with great tenacity. The following is the plan I have found to answer on the large scale. Place the casks upon their ends in a warm situation, and leave them so for a fortnight, or longer, if convenient. They may then be tapped *a little above the bottom*, when some of them will generally be found quite transparent, and may be drawn off and vatted, care being taken to avoid shaking up the bottom. Those that are foul must be filtered through one or more long Canton flannel bags, sunk in the bottom of a tin cistern, placed over a suitable receiver; a few pounds of coarsely-powdered charcoal being mixed up with the first 5 or 6 gallons thrown in. This will rapidly fill up the pores of the bag, and make the balsam flow clear and pale. The first runnings should be returned until it becomes perfectly transparent. The bottoms of the casks, containing the water or impurities, may be poured into a large can or jar, and allowed to deposite for a few days, when the copaiba may be poured off the top, and filtered. A sudden change of temperature will frequently turn a brilliant sample of this article opaque or milky; it is not, therefore, deemed fit to send out by the wholesale trade, unless it will "*stand*" this test. To ascertain this point, a common practice is to fill a small bottle with the copaiba, and to leave it out of doors all night in an exposed situation. (See also BALSAM OF COPAIBA.)

COPAIBA, ALKALINE TINCTURE OF. (LEWIS THOMPSON.) *Prep.* Dissolve 2 oz. of carbonate (formerly subcarbonate) of potassa in 1 pint of water, and add to this, balsam of copaiba in a thin stream, constantly stirring the mixture, until this, at first white and milky, becomes clear like jelly or amber, which will generally take place when about a pint of balsam has been added; set the mixture aside for two or three hours, then pour in two pints of spirit of wine, and mix the whole together; the solution is then fit for use, and may be flavored with any of the essential oils. Sweet spirit of nitre may be substituted for spirit of wine; but it is necessary to destroy its acidity by distillation from lime or potassa, otherwise a decomposition will take place.

This solution is compatible with iodide of potassium and nitrate of potassa, but is decomposed by all earthy, metallic, and ammoniacal salts, such as sulphate of magnesia, chloride of iron, acetate of ammonia, &c., which must not, therefore, be administered in conjunction with it. (Chemist, iv 510.)

COPAIBA AND KALI. *Prep.* Carbonate of potassa and water, of each equal parts; dissolve, and add gradually transparent balsam of copaiba until the fluid, at first milky, turns quite clear

COPAIBA CAPSULES. Gelatinous capsules filled with balsam of copaiba.

COPAIBA AND RHATANY, CAPSULES OF. Ricord has recommended capsules of copaiba, coated with extract of rhatany, as much superior to the common ones of copaiba alone, in the treatment of blenorrhœa. They may be easily prepared by either of the two following methods:

1. By immersing, for an instant, the common capsule in the following composition: or,
2. By forming the bodies of the capsules with the *composition*, instead of with *gelatin*, and following the same manipulations as for the manufacture of the common gelatin capsules.

The Rhatany Composition. Extract of rhatany, newly prepared from the root, 3 parts; sirup of moist sugar 1 part; mucilage of gum arabic 1 part. Melt the extract and reduce it in a water bath until sufficiently stiff, when cold; do the same with the sirup and gum; then mix them together while hot, but only in such quantity as may be used at one time.

These capsules are said to sit well upon the stomach, the tone of which they contribute to improve.

COPAIBA, MISCIBLE. *Prep.* Mix transparent balsam of copaiba with half its volume of liquor of potassa of double strength.

Remarks. Different samples of balsam often require *slightly* different quantities of the solution of potassa; it is therefore best to mix them gradually and cautiously together. Should the mixture be opaque, a *little* more, of one or other of the ingredients, as the case may be, will render it clear. No heat should be used. This article is miscible with water, with which it forms a kind of milk; and from containing *all* the volatile oil of the copaiba is a very valuable preparation. Its activity is considered equal to the balsam itself, and it is given in similar doses.

COPAIBA, MIXTURE OF. (CHOPART.) *Prep.* Copaiba, alcohol, sirup of Tolu, peppermint water, orange-flower water, of each ℥ij; sweet spirits of nitre ʒij. *Proc.* Rub the copaiba with the sirup until perfectly mixed, then add the spirits, and lastly the waters.

COPAIBA, SOLUBLE. *Prep.* I. Heat miscible copaiba to the boiling point, pour it while hot into a "*separator*," and place it in some situation where it will cool slowly. After a few days draw off the clear portion from a cock or hole placed *near* the bottom of the vessel, observing to stop the stream before any of the floating oil begins to flow through. *A very little* concentrated liquor of potassa added before applying the heat, will render it more soluble. *Prod.* Thick, clear, and soluble in pure water. Resembles copaiba in appearance.

II. Agitate balsam of copaiba with an equal measure of liquor of potassa, (P. L.;) boil for a few minutes in a clean tinned copper pan, then pour it into a separator, and proceed as before. Thinner than the last.

COPAIBA, SPECIFIC SOLUTION OF. (FRANK'S.) *Prep.* I. Balsam of copaiba 2 parts; liquor of potassa (P. L.) 3 parts; water 7 parts; boil it for 2 or 3 minutes, put it into a separator, and allow it to stand for 5 or 6 days, then draw it off from the bottom, avoiding the upper stratum of oil. To the clear liquid add 1 part of sweet spirits of nitre, perfectly free from acid, to which a few drops of liquor of potassa has been added, until it slightly browns turmeric paper; should it turn foul or milky, a *very little* liquor of potassa will usually brighten it; if not, place it in a clean separator for a few days, and draw it off from the bottom as before, when it will be perfectly brilliant without filtering.

Remarks. Some persons add the sweet spirits of nitre while the solution is still hot, mix it in as rapidly as possible, and immediately cork or fasten up the vessel. This is a good way when the article is wanted in a hurry, but is objectionable from the loss of spirit thereby occasioned, and the danger, without care, of bursting the separator.

A receipt for this article, upon the authority of Battley, has been going the round of the pharmaceutical works for some years, but which produces a preparation not at all resembling "*Frank's specific solution.*" It is as follows: "Take 12 oz. of balsam of copaiba and 6 oz. of calcined magnesia; rub together, add a pint of proof spirit, filter, and then add ½ oz. of sweet spirits of nitre." (Gray's Supplement.) I have tried this formula, and I find the product to be a white tincture, scarcely flavored with copaiba, and perfectly limpid. No sooner is balsam of copaiba mixed with half its weight of magnesia, than the two unite, and produce a compound insoluble in spirit of wine. Such is the affinity of this earth for copaiba, (copaibic acid,) that it will even take it from caustic potassa. Thus I find the solution of this balsam, (containing potassa,) if filtered through blotting-paper, with a little magnesia, becomes so strongly alkaline as to materially injure its quality, while a glutinous mass is deposited upon the sides and bottom of the paper. I have been led to a notice of this subject, from well knowing that many druggists have adopted this formula, and have been disappointed with the results, which are, however, only such as might be reasonably anticipated.

COPAIBA, SALT OF. *Syn.* SAL COPAIBÆ. There are two preparations bearing this name, the one, copaibic acid, and the other, copaibate of an alkali. They are both sold at ridiculously high prices. The advertisement of one of these preparations is heralded in with the following pseudo-philosophical announcement:

"*This preparation* of copaiba, in its chemical and medical analogies, may be compared to quinine from bark, the former being the tonic of the mucous membranes, and the latter that of the dermoid structures.

"*This salt* contains all the properties of the balsam of copaiba in a very concentrated form, without its nauseating qualities, and from this circumstance it may be administered to the most delicate constitution."

It is the general opinion of medical men, that the active properties of copaiba reside in a volatile or essential oil, of which the *above preparation is destitute.* It is therefore difficult to conceive how, in *this* instance, the reverse should be the case. I can speak from my own experience, and that of several high authorities to whom I have referred, that both the viscid and acid resins of copaiba are almost inert, and that all the alkaline preparations of these substances are nearly similar. I have taken the "sal copaibæ" myself, and have watched its action on others, but have not been able to

perceive any good effects to result from its administration.

COPAIBIC ACID. *Syn.* CAPIVIC ACID. The yellow brittle resin of balsam of copaiba. It is prepared by digesting the resin (left after distilling the oil from the balsam) in alcohol, which dissolves the acid resin, but leaves the viscid one. It may be purified by re-solution in alcohol. It forms about 50% of the balsam.

Prop. An amber-colored, brittle, semi-crystalline, resinous substance, soluble in alcohol, ether, and oils, reddens litmus paper, and forms salts with the bases, called copaivates. These may generally be made by dropping into a solution of the acid in alcohol, an alcoholic solution of a soluble salt of the base. The copaivates of potash, soda, and ammonia are easily prepared, by adding to an alcoholic solution of the acid another of the pure alkali, until it be neutralized, when the salts may be obtained by careful evaporation. Copaivate of silver is formed by neutralizing the acid with nitrate of silver, both being dissolved in alcohol, and then adding a little liquor of ammonia, when a white crystalline precipitate will subside. The copaivates of lead, lime, and iron, as well as several others, may be made in a similar manner.

Copaivate of magnesia may be made by adding copaivate of potassa to a solution of epsom salts. All these salts are easily decomposed by acids.

COPAL. *Syn.* GUM COPAL. A resinous substance, which exudes spontaneously from the Rhus copallinum, and the Elæocarpus copalifer. When of good quality, it is too hard to be scratched by the nail, and has a conchoidal fracture. It dissolves with difficulty, and this, combined with its extreme hardness, renders it very valuable for making varnishes.

SOLVENTS. I. *Caoutchoucine;* sparingly. II. Equal parts of *caoutchoucine* and *alcohol*, of ·825; freely soluble in the cold. III. *Absolute alcohol*, added gradually to the copal, previously rendered gelatinous by water of ammonia, assisting the union with heat. IV. *Alcohol* added to the copal, previously softened with ether. V. *Absolute alcohol* 1½ parts, digested on copal 1 part for 24 hours. (Unverdorben.) VI. *Alcohol*, to which a little camphor has been added. VII. *Ether;* and this solution may be diluted with alcohol. VIII. *Oils of rosemary* and *lavender*, (spike;) too expensive for general use. IX. *Copal*, heated until it fuses, acquires the property of dissolving in turpentine and alcohol. X. *Copal*, reduced to powder and exposed for some time to the air, also becomes soluble in alcohol and turpentine. XI. *Drying linseed oil*, at nearly the boiling point, dissolves copal, and will bear dilution with spirits of turpentine as soon as it has cooled sufficiently. This is the common way of making copal varnish. XII. *Ammonia* enables oil of turpentine to dissolve copal; but it requires such nice management of the fire, that it seldom succeeds completely. (Lewis.) XIII. *Powdered copal*, triturated with a little camphor, softens and becomes a coherent mass; and camphor, added either to alcohol or oil of turpentine, renders it a solvent of copal. ½ oz. of camphor is sufficient for 1 quart of oil of turpentine, which should be of the best quality; and the copal, about the size of a large walnut, should be broken into very small pieces, but not reduced to a fine powder. The mixture should be set on a fire so brisk as to make it boil almost immediately The vessel should be of tin or other metal, strong, shaped like a wine-bottle with a long neck, and capable of holding 2 quarts. The mouth should be stopped with a cork, in which a notch is cut to prevent the vessel from bursting. (Sheldrake.) XIV. A good varnish may be made by pouring upon the purest lumps of copal, reduced to a fine mass in a mortar, colorless spirits of turpentine, to about one third higher than the copal, and triturating the mixture occasionally in the course of the day. Next morning it may be poured off into a bottle for use. Successive portions of oil of turpentine may thus be worked with the same copal mass. (Varley, Tilloch's Mag. 51.)

*** In all the above cases the copal should be reduced to a *coarse* powder. A *fine* powder is apt to stick together and form hard lumps. The solution of copal, even in its most ready solvents, is attended with some difficulty, and frequently miscarries in the hands of the inexperienced. A mixture of caoutchoucine and alcohol (as in No. II.) is an exception.

COPAL, MELTED. Obtained by holding the gum before a good fire, so that as soon as the copal melts, it may drop into a pan of water: a kind of oil separates from it, and the copal becomes soluble in spirits of wine, and still more so if the melting is repeated.

COPAL, POWDERED. Copal reduced to powder and exposed to the air in a thin stratum, on sieves covered with paper, for 3 or 4 months. Soluble in alcohol.

COPPER. (From *cuprum*, a corruption of *κύπρος*, from the island of Cyprus, whence it was formerly brought.) A red-colored metal, too well known to require description.

Hist. Copper and its alloys appear to have been known to the most remote ages of antiquity. Brass, an alloy of copper, is mentioned by Moses (Job, xxviii.) upwards of 1600 years before the birth of Christ. (Hales.) This metal is found in the metallic state, and in combination with oxygen, sulphur, acids, and other minerals, and in the organic kingdom, in the ashes of plants, and in the blood of animals. (Sarzeau.) The copper of commerce is principally prepared from copper pyrites, a mixed sulphuret of iron and copper, found in Cornwall, and other parts of the world.

Prep. Copper is only prepared from its ores on the large scale. The copper pyrites is first roasted, and then smelted, by which process "*coarse metal*" is produced; this is again submitted to calcination and smelting, when "*fine metal*" is obtained. It afterwards undergoes the process of refining and toughening.

Prop. This metal is malleable and ductile. It has a specific gravity of 8·8 to 8·9, fuses at about 2000° Fahr., and volatilizes at higher temperatures. It forms numerous compounds, all of which are more or less poisonous.

Char. and Tests. The solutions of copper possess a blue or green color, and yield a blue precipitate with soda or potassa. Ammonia produces a bluish-white precipitato, soluble in an excess of the precipitant, forming a deep blue solution. Prussiate of potash gives a reddish-brown precipitate, sulphureted hydrogen and hydrosulphurets, a black

ac. A polished iron plate, immersed in an acidulous solution of copper, becomes coated with that metal.

Estim. The quantity of copper present in any compound, may be estimated by throwing it down from its solution by pure potassa, after which it must be carefully collected, washed, dried, ignited, and weighed. This will give the quantity of the oxide from which its equivalent of metallic copper may be calculated; every 5 parts of the former being (as near as possible) equal to 4 of the latter. Copper may also be precipitated at once in the metallic state, by immersing a piece of polished steel into the solution, but this method will not give very accurate results. Copper may be separated from lead by adding sulphuric acid to the nitric solution, and evaporating to dryness, when water digested on the residuum will dissolve out the sulphate of copper, but leave the sulphate of lead behind. From this solution the oxide of copper may be thrown down as before. Copper may be separated from zinc by sulphureted hydrogen, which will throw down a sulphuret of copper, which may be dissolved in nitric acid, and treated as above.

Uses. The applications of copper in the arts are too well known to require notice. In medicine, 3 or 4 grains of the filings were formerly given in rheumatism, and to prevent hydrophobia.

Ant. Copper in the metallic state appears to be inert, but most of its compounds are poisonous. The antidotes are, the white of egg, milk, or flour mixed with water. Iron filings (Payen, Chevallier, Dumas) and the prussiate of potash have also been recommended. A drachm or more of the latter may be taken dissolved in water, and ½ oz. or more of the former, ad libitum. Sugar has also been proposed as an antidote. (Duval, Postel.)

COPPER, ALLOYS OF. With *zinc* copper forms *brass;* with *tin, bronze, bell,* and *cannon metal.* An alloy made with 100 parts of copper and 50 of tin, forms *speculum metal. White copper* is formed by the addition of metallic arsenic, and *German silver* is a mixture of nickel, zinc, and copper. See these articles in their alphabetical places.

COPPER, ACETATES OF. I. (*Neutral Acetate. Syn. Distilled Verdigris. Binacetate of Copper. Crystallized Verdigris.*) *Prep.* Dissolve verdigris in vinegar, with the aid of heat, and crystallize. It forms dark green or blue crystals.

II. (*Diacetate. Syn. Verdigris. Ærugo.*) Formed by exposing sheets of copper to the vapor of acetic acid, in a warm situation. (See VERDIGRIS.) It forms a green or bluish-green powder.

III. (*Sesquibasic Acetate.*) The blue portion of verdigris, soluble in water.

IV. (*Trisacetate.*) The green insoluble portion of verdigris.

COPPER, ARSENITE OF. *Syn.* SCHEELE'S GREEN. *Prep.* Mix a solution of 2 parts of sulphate of copper in 44 of water, with a solution of 2 parts of potash of commerce, and 1 of pulverized arsenious acid, also in 44 of water. Both solutions being warm, the first is to be gradually poured into the second. The grass-green insoluble precipitate is to be washed with water.

COPPER, AMMONIURETED. *Syn.* CUPRO-SULPHATE OF AMMONIA. AMMONIATED COPPER, (P. E.) *Prep.* (*Ammonio-sulphate of Copper,* P. L.) Sulphate of copper ℥j; sesquicarbonate of ammonia ℥iss. Rub them together until carbonic acid ceases to evolve, then wrap it up in bibulous paper and dry it in the air.

Prop. By heat ammonia is evolved, and oxide of copper remains. Its aqueous solution changes the color of turmeric, and a solution of arsenious acid renders it green. (P. L.)

Uses. Employed in pyrotechny. It has been given in doses of ½ to 5 grs. in chorea, epilepsy, hysteria, &c., but it is principally employed as an injection and as a collyrium, in opacity of the cornea.

Remarks. Great care must be taken in drying this article, as it is apt not only to lose a large portion of its weight, but become of an inferior color. Both the ingredients should be separately reduced to powder before mixing.

COPPER, BEAN-SHOT. *Prep.* Melt copper, and pour it in a small stream into boiling water. It is in small lumps like peas or beans, hence its name.

COPPER, BLANCHED. *Prep.* Fuse copper with $\frac{1}{18}$ of its weight of neutral arsenical salt, under a flux of calcined borax, charcoal, and powdered glass.

COPPER, CARBONATE OF. *Syn.* DICARBONATE OF COPPER. MINERAL GREEN. *Prep.* Add a solution of carbonate of soda or potassa to a hot solution of protosulphate of copper.

Remarks. The beautiful green mineral called *malachite,* is a hydrated dicarbonate of copper. If the solution of copper in the above formula be employed cold, the precipitate has a bluish-green color. (See VERDITER.)

COPPER, CHLORIDES OF. *Prep.* I. (*Subchloride. Syn. Dichloride of Copper. Resin of ditto. White muriate of ditto.*) Distil a mixture of 1 part of copper filings, with two parts of corrosive sublimate.

II. (*Chloride. Syn. Muriate of Copper. Hydrochlorate of ditto. Protochloride of ditto.*) Dissolve protoxide of copper in muriatic acid, evaporate and crystallize.

Remarks. This salt forms green needles, is deliquescent, soluble in alcohol, and when heated, (under 400°,) loses its water, and becomes anhydrous chloride of copper, and assumes the form of a yellow powder. The first of these preparations is sometimes called the protochloride or muriate; the second the deutochloride.

COPPER, CHROMATE OF. *Prep.* Precipitate a salt of copper, with neutral chromate of potash; or dissolve hydrated peroxide or carbonate of copper in chromic acid. Caustic ammonia dissolves this salt, forming a magnificent dark-green liquid, from which, by the admixture of spirit of wine, ammonio-chromate of copper, or cupro-chromate of ammonia, is disengaged in the form of a powder of a splendid, rather dark-green appearance. The readiest way of preparing this permanent and beautiful color, is to add solution of chromate of potash to ammoniacal sulphate of copper.

COPPER, FEATHER-SHOT. *Prep.* Melted copper, poured in a small stream into cold water. It forms small pieces, with a feathered edge, hence the name. It is used to make solution of copper.

COPPER GREEN. *Syn.* OXY-CHLORIDE OF COPPER. BREMEN GREEN. BRUNSWICK DITTO. FRIEZLAND DITTO. *Prep* Pour a saturated solution of muriate of ammonia over copper filings or shreds in a close vessel, keeping the mixture in a warm place, and adding more of the solution from time to time, till 3 parts of muriate and 2 of copper have been used. After standing a few weeks, the pigment is to be separated from the unoxidized copper, by washing through a sieve; and then it is to be well washed, and dried slowly in the shade. This green is almost always adulterated with ceruse, which improves the color.

Remarks. A mixture of cream-tartrate, or carbonate of copper, with carbonate of lime and magnesia, is also sold under the name of Brunswick green.

COPPER, IN FINE POWDER. *Prep.* A solution of sulphate of copper is heated to the boiling-point, and precipitated with distilled zinc. The precipitated copper is then separated from the adherent zinc by diluted sulphuric acid, and dried by exposure to a moderate temperature. From recently precipitated chloride of silver, an exceedingly fine silver-dust may also be obtained by boiling it with water, acidulated with sulphuric acid and zinc. (Boettger's Beitrage.)

COPPER, IODIDE OF. I. (*Iodide.*) When iodide of potassium is added to a solution of a salt of copper, a diniodide of copper falls down, and an iodide remains in solution. It is but little known.

II. (*Diniodide.*) To a solution of 4 parts of protosulphate of copper, and 5 parts of protosulphate of iron, add a solution of iodide of potassium, wash and dry the precipitate.

Remarks. The last preparation is that commonly known in trade by the name of iodide of copper.

COPPER, OXIDES OF. I. (*Black Oxide. Syn. Protoxide of Copper.*) *Prep.* This may be formed by calcining metallic copper, nitrate of copper, or the hydrate, thrown down from solutions of the salts of copper by means of pure potassa. This preparation was formerly called the deutoxide of copper. It is not changed by heat, but readily gives out its oxygen when heated with combustible matter; hence its general use in organic analysis for supplying oxygen.

II. (*Red Oxide. Syn. Dioxide of Copper.*) *Prep. a.* Mix 31·6 parts of copper filings with 39·6 parts of black oxide of copper, and heat them together in a covered crucible.

b. Boil a solution of the acetate of protoxide of copper with sugar; collect the red powder, wash it with water, and dry it.

c. Mix dichloride of copper with an equal weight of carbonate of soda, and fuse it at a low red heat, then well wash the mass with water, and dry the red powder.

d. Mix 100 parts of sulphate of copper with 57 parts of carbonate of soda, (both in crystals,) and fuse them at a gentle heat; cool, pulverize, add 25 parts of fine copper filings, ram the mixture into a crucible, cover it over, and expose it for 20 minutes to a white heat.

e. A saturated solution of sugar of milk, containing some carbonate of soda, is poured over recently prepared moist hydrated oxide of copper, and heated to boiling. A dark orange-colored precipitate of hydrate of protoxide of copper soon appears, from which saccharine matter is remov by washing in distilled water, and then dried.

f. (*Magnificently red anhydrous protoxide copper.*) A solution of 27 parts of cane-sugar, 60 parts of water, is poured over 9 parts of h drate of oxide of copper, (weighed in the co pressed and still moist state;) a solution of parts of caustic potassa, in 60 parts of water, added; the whole mass well agitated together the ordinary temperatures, and strained throu linen. If the dark-blue liquid, after being pass through the strainer, is heated, continually stirri over the water-bath, anhydrous protoxide of co per is disengaged, and the liquid becomes colorle (Boettger's Beitrage.)

Remarks. Red oxide of copper resembles me tallic copper in appearance. It is used as a pi ment and a bronze. By heat it is converted in the black oxide. With ammonia it forms a col less solution, but rapidly becomes blue from th action of the air. This preparation was formerl called *protoxide of copper.*

III. (*Peroxide.*) Formed by the action of per oxide of hydrogen water, on the hydrated blac oxide. (Thenard.) It is very liable to spontaneous decomposition.

Remarks. According to the opinions of Berze lius, Thompson, Liebig, Gregory, and others, th eq of copper is 31·6, and consequently the re oxide is a sub- or di-oxide, and the black the oxi or protoxide. The former containing 63·2 part of copper and 8 of oxygen, and the latter 31·6 of copper and 8 of oxygen. But if the eq. of coppe be taken at 63·2, as is done by some persons, th first of these preparations must be regarded as th protoxide, and the second as the deuto- or bin oxide. The latter terms were generally applied to them in chemical works, until within the las few years. The black oxide has also been calle the *peroxide.* This explanation is called for, t prevent the tyro in chemistry mistaking the one preparation for the other.

COPPER, SALTS OF. These are more or less poisonous, and may be recognised in the manner as described under the article COPPER.

COPPER VESSELS. Culinary and pharmaceutical vessels are very commonly made of copper, but too much caution cannot be exercised in their employment. Acid sirups, vegetable juices, aqueous extracts, soups, stews, &c., prepared in copper saucepans, or boilers, receive a metallic contamination proportional to the length of time they are exposed to the action of the metal. Such vessels are frequently tinned, for the purpose of protecting the copper from contact with their contents, but this film of tin is necessarily very thin, and rubs off by constant use. When acids or acidulous fluids are boiled in vessels of imperfectly tinned copper, a portion of the tin is taken up by the liquid, and deposited upon the abraded or exposed part, thus protecting the copper from the farther action of the menstruum; but the protective power of such a deposite is limited, and it has been proved that when a coating of metal is extremely thin, though appearing quite perfect to the eye, it has a certain porosity, that permits the action of acids on the metal beneath. This has been proved to be the case, even when the deposite is of silver. (Warrington.) When copper vessels

allowed to remain wet or dirty, and especially sy, a poisonous green matter forms upon their ce, somewhat similar to verdigris, and if ar- prepared in them without their being first rly cleaned, be taken as food, serious conse- es may ensue. Cases of poisoning from this are frequently met with, and instances of ing following the use of such articles are still common. I have known extracts prepared pper pans deposite a coating of that metal the knives used to stir them, and the ashes the inspissated juices of fresh vegetables, and cially the pulps of fruit, prepared in vessels of same metal, have exhibited the presence of per on the application of chemical tests. The t wholesome material for culinary utensils is sheet iron or tin plate, which is very durable pt clean and dry when not in use. Copper els of every kind should be cleaned out, im- diately before use, even though they may appear to want it, and on no account should y be employed for any fluids that are the least idous, or that are required to remain long in m.

COPPERAS. *Syn.* Green Copperas. Green triol. Vitriol of Iron. Commercial Sul- te of Iron. Crude sulphate of iron, made by wing iron pyrites to effloresce in the air, wash- out the salt, boiling along with scraps of old , evaporating and crystallizing.

COPPERAS, CALCINED. *Syn.* Dried phate of Iron. Calcined ditto. *Prep.* Heat en vitriol in an unglazed earthen pot, or spread t in a warm situation, until it becomes white d dry. *Use.* It is astringent and drying, and is etimes used in making ink, and in dyeing.

CORAL, FACTITIOUS. Prepared chalk d, colored with a little sesquioxide of iron, or pink, and passed through a sieve. This is al- st universally sold by the druggists for powdered al. It possesses similar properties.

CORDIAL, (in Medicine.) Any warm stim- nt that tends to raise the spirits and promote circulation. The principal cordial medicines the aromatized tinctures.

CORDIAL, (in the art of the Rectifier.) matized and sweetened spirit, employed as a erage.

Cordials are prepared by either infusing the aro- atics in the spirit, and drawing off the essence distillation, which is then sweetened, or without tillation, by flavoring the spirit with essential s, or simple digestion on the ingredients, adding gar or sirup, as before. Malt or molasses spirit the kind usually employed, and for this purpose ould be *perfectly flavorless;* as, if this be not e case, the quality of the cordial will be inferior. ectified spirit of wine is generally the most free om flavor, and when reduced to a proper strength ith water, forms the best and purest spirit for rdial liquors. Spirit which has been freed from s own essential oil, by careful rectification, is mmonly called '*pure,*' '*flavorless,*' '*plain,*' or *lent spirit.*' The solid ingredients should be ately pounded or bruised, before digestion in the pirit, and this should be done immediately before tting them into the cask or vat; as, after they e bruised, they rapidly lose their aromatic prop- ties by exposure to the air. The practice of drying the ingredients before pounding them, adopted by some workmen for the mere sake of lessening the labor, cannot be too much avoided, as the least exposure to heat tends to lessen their aromatic properties, which are very volatile. The length of time the ingredients should be digested in the spirit, should never be less than 3 or 4 days, but a longer period is preferable when distil- lation is not employed. In either case, the time allowed for digestion may be advantageously ex- tended to 10 days or a fortnight, and frequent agi- tation should be had recourse to. When essential oils are employed to give the flavor, they should be first dissolved in a little strong alcohol, or recti- fied spirit of wine, so as to make a perfectly trans- parent solution; and when added to the spirit, they should be mixed up with the whole mass as rapidly and as perfectly as possible, by laborious and long-continued agitation. In managing the still, the fire should be proportioned to the ponder- osity of the oil or flavoring, and the receiver should be changed before the faints come over, as the latter are unfit to be mixed with the cordial. The stronger spirit may be reduced to the desired strength by means of *clear* soft water, or the clar- ified sirup used for sweetening. The sugar em- ployed should be of the finest quality, and is pref- erably made into capillaire or sirup before adding it to the aromatized spirit; and this should not be added until the latter has been rendered perfectly fine by filtering or fining. Some spirits, as aniseed, &c., frequently require this treatment, which is best performed by running them through a fine and clean wine-bag, having previously mixed them with a spoonful or two of magnesia. By good management, cordials thus made will be perfectly "clear" and transparent; but should this not be the case, they may be fined with the whites of about 12 or 20 eggs to the hogshead, or by adding a little alum, either alone, or followed by a little carbonate of soda or potassa, both dissolved in wa- ter. In a week or a fortnight the liquor will be clear. (See Clarification.)

A most convenient and easy way of manufac- turing cordials, especially where it is wished to avoid keeping a large stock, is always to keep two casks of sweetened spirit ready prepared, at the strength of 60 or 64 u. p. The one should contain 1 lb. of sugar to the gallon, the other 3 lbs. per gallon. From these may be made spirit of any intermediate sweetness, which may be flavored with any essential oil dissolved in alcohol, or any aromatic spirit, prepared either by digestion or dis- tillation. As a general rule, the concentrated es- sences may be made by dissolving 1 oz. of the es- sential oil in 1 pint of the strongest rectified spirit of wine. This solution should be kept in well- corked bottles, and used by dropping it cautiously into the sweetened spirit, until the desired flavor is produced. During this operation, the cordial should be frequently and violently shaken, to produce a perfect admixture. Should sufficient essence to foul the liquor be added by accident, the transpa- rency may be restored by the addition of a little more spirit, or by clarification.

The most frequent cause of failure in the manu- facture of cordials, is the addition of *too much fla- voring*. Persons unaccustomed to the use of strong aromatics and essential oils, seldom sufficiently es-

timate their power, and consequently, generally add too much of them, and thus not only is the liquor rendered disagreeably high flavored, but the quantity of oil present turns it '*milky,*' or '*foul,*' on the addition of the water. This again is another source of annoyance, as from the consistence or viscidity of the fluid, it is less readily '*fined down*' than unsweetened liquor, and often gives much trouble to clumsy and inexperienced operators. The most certain way to prevent this is to use *too little*, rather than *too much* flavoring; for if the quantity prove insufficient, it may readily be '*brought up,*' even after the cordial is made.

A careful attention to the previous remarks will render this branch of the rectifier's art far more perfect and easy of performance than it is at present, and will, in most cases, produce at *once* a satisfactory article, '*fine, sweet,* and *pleasant.*'

It may be observed, before concluding this short notice, that the majority of cordials may be made with the pure essential oils, of *nearly* equal flavor to those prepared by distillation; and for such as *are colored,* simple digestion of the ingredients is almost universally employed. Inferior lump, or even good brown sugar is used for some dark and strong-flavored articles. Ingredients that are *not volatile,* are, of course, always added after distillation. Though I have said that very excellent cordials may be made *without* distillation, yet the *still* should be always employed to impart the flavor and aroma of volatile aromatics to spirits, when the expense, labor, and time are of no importance compared to the production of a superior article. The strength at which cordials are usually sent out by permits is 60 or 64 u. p.

CORDIAL, ANISEED. *Prep.* I. Aniseed (bruised) 1 lb.; proof spirit 6 gallons; macerate for a week; then distil 5 gallons; add 2 gallons of clear soft water, and 1 gallon of clarified sirup. This will make 8 gallons of cordial 24 u. p., which is as weak as "aniseed" should ever be made. It may be reduced by sweetened water.

II. Instead of distilling off the spirit, merely pass it through a wine-bag, to take off the seed, lower it with clear soft water, and sweeten as before.

III. Instead of 1 lb. of aniseed, add enough of the essential oil, dissolved in spirit of wine, to produce the desired flavor; 2 drachms of the oil is fully equal to 1 lb. of the seeds.

CORDIAL, BILIOUS, (CHAMBERLAIN'S.) An American medicine, prepared from the inner bark of the juglans cinerea, mixed with spices.

CORDIAL FOR CALVES. *Prep.* I. Caraways, powdered, ½ oz.; ginger and carbonate of soda, of each a spoonful; gin or brandy, ¼ of a wineglassful; water 6 oz.

II. Brandy ½ oz.; cow's urine 4 oz.; mix. (Gray.)

Use. As a stimulant for looseness, &c., in calves.

CORDIAL, CARAWAY. *Prep.* Bruised caraway seeds 3 lbs., or, essential oil of caraway 1½ oz.; sugar 56 lbs.; clean spirit, at proof, 40 gallons; water q. s.

Remarks. The addition of 30 drops of oil of cassia, and 20 drops each of essence of lemon and orange-peel, to the above quantity, improves the flavor; also a larger quantity of sugar must used, if the cordial is to be much lowered.

II. Seeds ¼ lb., or oil 1 drachm; proof spiri gallon; sugar 3 lbs.; water q. s. As last.

CORDIAL, CEDRAT. *Prep.* I. Essence cedrat ¼ oz.; dissolve in pure proof spirit 1 gall add water 3 pints, agitate well; draw off 3 qua and add an equal measure of clarified sirup.

Remarks. This is a most delicious cordial.

II. Cut 12 lemons in pieces, and digest in spi of wine 1 gallon; add water 1 quart; draw o gallon, and add an equal weight of capillaire. I ferior to the last.

CORDIAL, CINNAMON. This is seld made with cinnamon, but with either the essen oil, or bark of cassia. It is preferred colored, a therefore may be very well prepared by simple gestion. If the oil be used, 1 dr. will be found be enough for 2 or 3 gallons of spirit. The ad tion of 2 or 3 drops each of essence of lemon a orange peel, with about a spoonful of essence cardamoms to each gallon, will improve it. So persons add to the above quantity 1 drachm cardamom seeds and 1 oz. each of dried oran and lemon peel. 1 oz. of oil of cassia is conside to be equal to 8 lbs. of the buds, or bark. wanted dark it may be colored with burnt sug The quantity of sugar is 1½ lb. to the gallon.

CORDIAL, CITRON. *Prep.* Yellow rind citrons 3 lbs.: orange peel 1 lb.; nutmegs brui 2 oz.; proof spirit 13 gallons; distil . macera add water sufficient, and 2 lbs. of fine lump sug for every gallon of the cordial.

CORDIAL, CLOVE. *Prep.* Bruised clo 1 oz., or essential oil, 1 dr. to every 4 gallons proof spirit. If distilled it should be drawn o with a pretty quick fire. It is preferred of a ve deep color, and is therefore strongly colored w poppy-flowers or cochineal, or more commo with brandy coloring, or red sanders wood. should have 3 lbs. of sugar to the gallon, and t need not be very fine. The addition of 1 drach of bruised pimento, or 5 drops of the oil for eve ounce of cloves, improves this cordial.

CORDIAL, CORIANDER. *Prep.* 1 lb. coriander seeds; 1 oz. of caraways, and the p and juice of 1 orange to every 3 gallons of pro spirit.

CORDIAL, GOLD. *Prep.* Angelica ro sliced, 1 lb.: raisins ½ lb.; coriander seeds 2 o caraway seeds and cassia, of each 1½ oz.; clo ½ oz.; figs and sliced liquorice root, of each 4 o proof spirit 3 gallons; water 1 gallon. Diges days, and draw off 3 gallons by a gentle heat; this add 8 lbs. of sugar dissolved in 1 quart ea of rose-water and clear soft water, and stee oz. of hay saffron in the liquid until it acquire proper color.

Remarks. The above is the form for a cordi once in much esteem, and which derived its na from a small quantity of gold leaf being added to It is now but little drunk, and this addition seld made.

CORDIAL, GODFREY'S. *Prep.* I. Mo lasses 15 lbs.; distilled water 2¼ gallons; dissolv add oil of sassafras 1 oz. dissolved in rectified spi of wine ½ gallon, bruised ginger ¼ oz.; cloves ¼ o laudanum 8 oz.; macerate for 14 days, and st through flannel.

II. Sassafras chips 1 lb.; ginger bruised 4 oz.; ter 3 gallons; simmer until reduced to 2 gal-; then add treacle 16 lbs., rectified spirits 7 , and laudanum 1 pint.

III. Opium ½ oz.; treacle 5 lbs.; boiling water allon; dissolve, and add rectified spirit ½ pint; of sassafras ½ dr.; cloves, mustard seed, of each ; corianders and caraway seeds, of each 1 dr.; st for a week.

V. Caraway, corianders, and aniseed, of each ; water 6 gallons; distil 5 gallons, and add cle 28 lbs.; mix, then add laudanum 1 quart, oil of sassafras 1 oz. previously dissolved in ified spirit 1 gallon.

Remarks. The above forms are those commonly ent in the drug trade. This cordial is anodyne narcotic, and is commonly given to children bled with wind or colic. Its frequent and ex-ive use has sent many infants prematurely to grave. Gray says, "*It is chiefly used to pre- the crying of children in pain or starving.*" dose is ½ of a teaspoonful and upwards, ac-ng to the age of the child.

CORDIAL, GOUT. *Prep.* Rhubarb, senna, ander seed, sweet fennel seed, and cochineal, ach 2 oz.; liquorice root and saffron, of each 1 ; raisins 2½ lbs.; rectified spirit of wine 2 gal-; digest for 14 days. Used in gout and rheu-ism. *Dose.* 1 tablespoonful to ½ oz. It is atic and slightly laxative.

CORDIAL, HORSE. *Prep.* Compound tinc- of benzoin 1 pint; compound spirit of ammo-, and sweet spirits of nitre, of each 8 oz.; mix; it up in Bateman's bottles, and seal them.

CORDIAL LEMON. *Prep.* Digest 2 oz. of fresh and dried lemon peel, and 1 oz. of orange peel in 1 gallon of proof spirit for a k; strain with expression, add clear soft water educe it to the desired strength, and lump su- in the proportion of 2½ lbs. to 3 lbs. to the gal- The addition of a little orange-flower or rose- er improves it.

CORDIAL, LOVAGE. *Prep.* Fresh roots of ge 2 oz.; fresh roots of celery and sweet fen- of each 1 oz.; essential oil of caraway ¼ oz.; f spirit 3 gallons; digest for 7 days, add wa- 1 gallon; distil off 2½ gallons; add water to e it of the desired strength, and sweeten with sugar. To the above ingredients some per- add, before distillation, ¾ oz. of fresh valerian and 1 drachm of oil of savine.

CORDIAL, NERVOUS. (Brodum's.) *Prep.* tures of gentian, calumba, cardamoms, and hona, compound spirits of lavender, and steel e, of each equal parts. Tonic and stomachic.

CORDIAL, ORANGE. Like lemon cordial, fresh orange peel to the gallon.

CORDIAL, PEPPERMINT. *Syn.* Sports-'s Cordial. Eau de Chasseurs. *Prep.* Add sh oil of peppermint 2 oz. to rectified spirit of 1 quart, agitate well in a corked bottle, ca- of holding 3 pints or more, then pour it into sk having a capacity of upwards of 100 gal-; add 36 gallons of perfectly white and fla- proof spirit, agitate well for 10 minutes, add 2 cwt. of the best refined lump sugar, ously dissolved in twice its weight of pure ed rain water; rummage well, and further sufficient clear rain water to make up the whole quantity to exactly 100 gallons; again rummage well; add 2 oz. alum, dissolved in 1 quart of rain water, and a third time agitate for 15 minutes, after which put in the bung and let it stand for a fortnight, when it will be fit for sale.

Remarks. The above produces a beautiful article, provided the oil of peppermint be of good quality, the sugar double refined and stove-dried, and the cask one that will not give color. To ensure the *first*, the oil should be purchased of some known respectable dealer. That prepared at Mitcham, Surrey, and hence called "*Mitcham oil of peppermint*," is not only the strongest but best flavored, and though more than double the price of the foreign oil, is, in the long run, much the cheapest. *The sugar* should be sufficiently pure to dissolve in a wine glassful of clear soft water, without injuring its *transparency*, and the *cask* should be a fresh-emptied gin pipe, or one properly prepared for gin, as if it give color it will spoil the cordial. If these particulars be attended to, the product will be a *clear transparent* liquor as soon as made, and will not require fining; but should there be the slightest opacity, some alum may be added as above, which will clear it down. Some persons add more oil of peppermint, others less, than the quantity I have ordered, but this, as well as the weight of sugar, must depend upon the taste of the purchasers, and the price the liquor is to be sold at. The product is 100 gallons of cordial at 64 u. p., which is the strongest usually sent out. A similar plan may be followed for the manufacture of any other cordial liquor, the same principles and operations being common to all.

CORDIAL, Sir WALTER RALEIGH'S. *Syn.* Sir W. Raleigh's Confection. Aromatic do. *Prep.* Fresh summits of rosemary and juniper berries, of each 1 lb.; cardamom seeds, zedoary, and saffron, of each ½ lb.; proof spirit 1½ gallons; digest for a fortnight, express and strain; evaporate to 2½ lbs. and add Gascoigne's powder 1 lb.; cinnamon and nutmegs, of each 2 oz.; cloves 1 oz., white sugar 2 lbs., mix well together.

Remarks. The above formula is that for the original aromatic confection. Sir Walter Raleigh's own receipt was far more complicated.

CORDIAL, SPORTSMAN'S. *Syn.* Eau de Chasseurs. *Prep.* Peppermint water and rectified spirits of wine, of each 1 pint; lump sugar ½ lb. Dissolve the sugar in the water and add it to the spirit.

CORDIAL, WARNER'S. *Prep.* Rhubarb ℥j; senna ℥iss; saffron ʒj; liquorice root ʒiv; raisins lb. j; rectified spirit lb. iij: digest for a fortnight. Laxative.

CORK. *Syn.* Corker. The lichen omphalodes made into balls. Used to dye wool.

CORKS. The common practice of employing inferior corks for the purpose of stopping the mouths of bottles, is often productive of considerable loss, from the air being only partially excluded, and the contents suffering in consequence. I once saw a large "*bin*" of valuable wine become, in less than a year, little better than sour Cape, from the parsimony of its owner on this point, and I have frequently had to regret the loss of valuable chemical preparations from a similar cause. The best corks are those called "*velvet corks*," and of these the finest qualities are imported from France.

CORNS. Round, horny, cutaneous extuberances, with central nuclei, very sensitive at the base, arising from continued pressure over the projection of the bones, from *tight* or stiff shoes or boots. Corns are of two kinds, hard and soft. The former grow on the exposed portions of the joints, the latter between the toes.

Treat. First soak the feet in warm water for a few minutes, then pare the corns as close as possible with a sharp knife, taking care not to make them bleed. They may now be touched over with a little lunar caustic, or nitric acid. The former is used by merely rubbing it on the corns, previously *slightly moistened* with water; the latter by moistening them with it, by means of a strip of wood, or preferably a rod of glass. This treatment adopted every other day for 10 or 12 days, accompanied by the use of *soft, loose shoes,* will generally effect a cure. Concentrated acetic acid may be used instead of nitric acid, and is preferred by some persons from not staining the skin, but it is less active, and requires to be more frequently applied. It has been recommended to remove large corns by ligatures of silk, applied as close to the base as possible, and tightened daily until they drop off; but this plan is tedious, and is not always successful. Another mode of extirpation is the application of a small blister, which will frequently raise them with the skin out of their beds. In this case the exposed surface must be dressed with a little simple ointment. Soft corns may also be easily removed by applying ivy leaf previously soaked in strong vinegar, changing the piece every morning; or by placing a dressing of soap cerate, spread on a bit of lint or old rag, between the toes. One of the simplest and best remedies for hard corns, and which has lately received the sanction of high medical authority, is to wear upon the toe or part affected a small circular pi of soft leather, or still better, a piece of amad spread with diachylon or other emollient plas and having a hole cut in its centre the size of corn. (Sir B. Brodie.) By this means the press of the boot or shoe is equalized, and the corn p tected.

Prevention. This consists in keeping the f clean, by frequent ablutions with warm water, the use of *easy, soft shoes or boots.* Without latter precaution, corns will generally return, ev after they appear to have been perfectly remov

CORNS, POPULAR REMEDIES FOR. (*Lotion.*) Sal ammoniac 1 oz., spirit 4 oz.; dissol Moisten the corn with this lotion every morni and evening.

II. (*Powder.*) Savine leaves 2 oz.; verdigri oz.; red precipitate ½ oz.; all in powder. Mix. A plied by means of a piece of rag to the corn night

III. (*Plaster.*) White diachylon and yel rosin, of each 2 oz.; melt and add finely-powde verdigris 1 oz. For use, spread it on paper, lin or leather, and apply a small piece to the corn.

CORN SOLVENT, SIR H. DAVY'S. *Pr* Potash 2 parts, salt sorrel 1 part; each in f powder. Mix and lay a small quantity on t corn for four or five successive nights, binding it with a rag.

CORRECTING PROOFS. (IN TYPOGRAPH The operation of marking on the proof sheets o work any errors of orthography, punctuation, a rangement, or language, they may contain, a also any alterations that may appear necess The following specimen will explain the meth generally adopted for this purpose, and with a li attention will enable any person to superintend work through the press, as far, at least, as d pends upon the correction of the proofs:

but occur in greater quantity when damaged grain is employed to make the mash. It has been proposed to prevent, or at least to lessen the production of this oil, by not pushing the attenuation of the wort too far, or by the addition of a certain quantity of tartaric acid or bitartrate of potassa to the wort before submitting it to fermentation. The best means of depriving spirits of these, or other substances of a similar nature, is to largely dilute them with water, and to draw them over at a gentle heat. Agitation with olive oil, decantation, dilution with a large quantity of water, and redistillation at a moderate heat, have also been recommended. An excellent method, frequently adopted to purify nauseous whiskey distilled from corn-spirit, is filtration through a series of 6 or 8 vessels, filled with *newly-burnt* and coarsely-powdered charcoal. This plan succeeds perfectly with moderately diluted spirits.

On the Continent the peculiar taste which grain and potato oils impart to spirit is termed "*fusel.*" To remove this, about 10 per cent. of common vinegar, and a *very little* sulphuric acid are added, and well mixed by agitation. The spirit is next allowed to repose for a few days, and then distilled. A solution of chloride of lime is also employed for the same purpose, and in the same way. In both the above cases, a species of ether is formed which possesses a very agreeable odor. In the first case, acetate of oxide of amylol is produced, which has so pleasant a taste and smell of fruit, that "it may be employed for perfuming apartments and making ratifias." The chloride of amylol has also a pleasant ethereal smell and taste. The affinity of the hydrated oxide of amylol (fuselöl) for acetic acid is so great, that they readily unite without the intervention of a mineral acid. (Doebereiner.) Thus, the oil of vitriol mentioned above, though always used in practice, might be omitted without any disadvantage.

It is often of the utmost importance to brewers, wine-merchants, sugar-refiners, &c., to be able to lessen the activity of the vinous fermentation, or to stop it altogether, or to prevent its accession to sirups or saccharine and vegetable solutions. The nature of the animalized matter forming ferment, the presence of which is necessary to fermentation, will readily suggest the proper means to be employed in such cases. Whatever will still the motion of the molecules of the nitrogenous matter forming the ferment, will render them inoperative as exciters of fermentation. Among the simplest means of effecting this object, and such as admit of easy practical application, may be mentioned exposure to either *cold* or *heat.* At a temperature below about 50° F., the acetous fermentation ceases altogether, and the alcoholic fermentation proceeds with diminished activity as the temperature falls, until at about 38° F. it entirely ceases. In like manner, the rapid increase of the temperature of a fermenting liquid will arrest its fermentation, and is preferable to the action of cold, as it is of easier application, and perfectly precipitates the ferment in an inert state. For this purpose, a temperature of about 180 or 200° is preferable, or even that of boiling water may be employed with advantage. In practice, fluids are commonly raised to their boiling point for this purpose, or are submitted to the heat of a water-bath, (207½° F.) In this way the fermentation of sirups and vegetable solutions and juices is usually arrested in the pharmaceutical laboratory.

Among substances that may be added to liquids to arrest fermentation, the most active are—the volatile oil of mustard, coarsely-powdered mustard seeds or *pure* flour of mustard, sulphurous acid or the fumes of burning sulphur, sulphuric acid, sulphite of lime, tincture of catechu, alcohol, strong acetic acid, chlorate of potassa, bruised horseradish, garlic, and cloves, and their essential oils, and all the other volatile oils that contain sulphur, and most of the salts that readily part with their oxygen. All the above arrest fermentation, and render yeast inoperative, and they possess this power nearly in the order in which they stand above. In practice, mustard, the fumes of burning sulphur, and sulphite of lime, are those most adapted for beer, cider, wines, sirups, &c.; but some of the others are occasionally used, though less active. For arresting or preventing the fermentation of the vegetable juices and solutions, and the *medicated* sirups employed in pharmacy, *mustard seed, or this with a little bruised cloves,* should alone be used, as the addition of acids or salts would lead to the decomposition of their active principles. For this reason such liquids should be kept in a sufficiently low temperature to prevent fermentation, and should they pass into that state, it should be preferably arrested by the application of heat or cold, as above explained. (See BREAD, BREWING, YEAST, &c.)

3. The *viscous or mucilaginous fermentation,* is that peculiar change which produces the "ropiness" of wine, beer, and other liquors. This species of decomposition is exhibited in the most complete state, when the juices of carrots, onions, beet roots, &c., are fermented at a temperature of from 100° to 120° Fahr. At ordinary temperatures alcohol is formed, but in this case the sugar is converted into mannite, lactic acid, and a peculiar substance which is precipitated as a species of slimy mucilage on the addition of alcohol. Weak solutions of sugar (1 to 20) boiled with yeast or gluten, and kept at a temperature of from 85° to 105° Fahr., readily pass into this kind of fermentation. The best means of arresting this disposition in fermented liquors, is the addition of a little alum or catechu, dissolved in water, or an infusion or decoction of nut galls. A small quantity of sulphurous or sulphuric acid will produce a like effect. When weak sirups are attacked in this way, the best remedy is to heat them to the boiling point.

4. The *acetous fermentation,* or the production of vinegar by the oxidation of alcohol, has been already briefly touched on, under the head ACETIFICATION. It may be here remarked, that this species of fermentation differs from those previously noticed; for whereas they are capable of continuing in vessels *without* access of air, when once excited, *this* is immediately stopped when the air is *excluded,* and under ordinary circumstances proceeds with a degree of rapidity proportionate to the amount of surface exposed to the action of atmospheric oxygen. It also differs from the alcoholic fermentation by the products being formed, not only by a new grouping of the elements of the substance undergoing decomposition, but by means

CORROSION, PREVENTION OF. The best means of preventing the corrosion of metals is first to dip the articles into very dilute nitric acid, and afterwards to immerse them in linseed oil, allowing the superfluity of oil to drain off; they are by this means very effectively preserved from rust or oxidation. (W. J. Lander.)

COSMETICS. (*Cosmetica*, from Κοσμέω, *I adorn.*) Any external application used for the purpose of preserving or restoring the beauty. The term is generally understood to refer to substances applied to the cuticle, to improve the color and clearness of the complexion; but some writers have included under this head, every topical application to promote the personal appearance. Hence cosmetics may be divided into three kinds, viz.:—*Cutaneous cosmetics*, or those applied to the skin; *hair cosmetics*, or such as are employed to promote the growth and beauty of the hair; and *teeth cosmetics*, or such as are used to cleanse and beautify the teeth. The present article will be confined to a short notice of the first of these divisions, referring the reader to the separate heads —*hair dyes, pomatums, pommades, depilatories, dentifrices, tooth powders, &c.*, for information respecting the remainder.

CUTANEOUS COSMETICS. The most simple and universally employed cosmetics are soap and water, which at once cleanse and soften the skin. Soap containing a full proportion of alkali, exercises a solvent power upon the cuticle, a minute portion of which it dissolves; but when it contains a small preponderance of oily matter, as the principal part of the milder toilet soaps now do, it mechanically softens the skin and promotes its smoothness. Almond, Naples, and Castile soaps are esteemed for these properties, and milk of roses, cold cream, and almond powder, (paste,) are used for a similar purpose. To produce an opposite effect, and to harden the cuticle, spirits, astringents, acids, and astringent salts are commonly employed. The frequent use of hard water has a similar effect. The application of these articles is generally for the purpose of strengthening or preserving any given part against the action of cold, moisture, &c.; as the lips, or mammæ, from chapping, or the hands from contracting chilblains; but in this respect, oils, pommades, and other oleaginous bodies, are preferable.

Another class of cutaneous cosmetics are employed to remove freckles and eruptions. Among the most innocent and valuable of these, is Gowland's lotion, which has long been a popular article, and deservedly so, for it not only tends to impart a delightful softness to the skin, but is a most valuable remedy for many obstinate eruptive diseases, which frequently resist the usual methods of treatment. Bitter almonds have been recommended to remove freckles, (Celsus,) but moistening them with a lotion made by mixing 1 oz. of rectified spirit of wine, and a teaspoonful of muriatic acid, with 7 or 8 oz. of water, is said to do this more effectually. A safe and excellent cosmetic is, an infusion of horseradish in cold milk. (Withering.)

Skin paints and stains are employed to give an artificial bloom, or delicacy to the skin. Rouge and carmine are the articles most generally used to communicate a red color. The former is the only cosmetic that can be employed, without i jury, to brighten a lady's complexion. The latt though possessing unrivalled beauty, is apt to i part a *sallowness* to the skin by frequent u Starch powder is employed to impart a white tu and is perfectly harmless. The American ladi who are very fond of painting their necks whit use finely-powdered magnesia, which is anoth very innocent substance. Several metallic co pounds, as trisnitrate, subchloride, and oxide bismuth, (pearl white, Fard's white, &c.,) carb nate of lead, (flake white,) white precipitate, &c are frequently used to revive faded complexion but they are not only injurious to the skin, but a as poisons, if taken up by the absorbents. Tri nitrate of bismuth, (pearl white,) probably t least injurious of these articles, has caused spa modic tremblings of the muscles of the face, en ing in paralysis. (Vogt. Pharm.) The employme of liquid preparations, containing sugar of lea which are commonly sold under the name of mi of roses, cream of roses, &c., is equally injurio Another disadvantage of these white metall preparations is, that they readily turn black, wh exposed, to the action of sulphureted hydrog gas, or the vapors of sulphur, which frequent escape into the apartment from coal fires. The are many instances recorded, of a whole compa being suddenly alarmed, by the pearly complexi of one of its belles being suddenly transform into a sickly gray or black. A friend of the wr ter's was once startled at a Christmas party b observing the one side of a lady's face and nec which was exposed to the fire, become discolo in this way, and was so amused on learning t cause, that he has since played two or three jo of the kind on some petulant old ladies, remar able for the great attention they pay to their to let. In conclusion it may be remarked, that t best *purifiers of the skin* are soap and wat followed by the use of a *coarse* cloth, in oppo tion to the *costly* and *soft diapers* that are co monly employed; and the best *beautifiers*, HEALTH, EXERCISE, and GOOD TEMPER.

COSMETIC, SIMPLE. *Prep.* Soft soa lb.; melt over a slow fire with a gill of sweet add half a teacupful of fine sand, and stir mixture together until cold. The shelly sea- sifted from the shells, has been found better that which has no shells.

Remarks. This simple cosmetic has, for se years past, been used by many ladies who ar markable for the delicate softness and whit of their hands, which they, in a great mea attribute to the use of it. Its cheapness is a recommendation.

COUGH. The sudden and violent exp of air from the lungs. It is generally sym matic of other affections, but is sometimes idi thic. Many cases of cough depend upon th tension of catarrh to the trachea and bron which thus become loaded with mucus or phl which they endeavor to throw off by the co sive effort called coughing. In some cases caused by a vitiation and inspissation of the s tions, arising from the imperfect action of th sorbents; this is the common cause of the cough of old people. Idiopathic cough is not sidered dangerous in itself, or while runnin

regular course, but it is often productive of most serious consequences, by superinducing the inflammation of some organ, or laying the foundation of phthisis.

Cough is sometimes attended by copious expectoration, and at other times exists without any; it has hence been distinguished into *moist* or *mucous* cough, and *dry* cough.

Treat. The treatment of common catarrhal cough consists in allaying the irritation as much as possible, by demulcents and expectorants, as mucilaginous drinks and lozenges, which act upon the glottis, and sympathetically upon the trachea and bronchiæ. Among the first may be mentioned, almond milk, barley water, refined Spanish juice, gum arabic, and a mixture of the last two made into lozenges; among the second, the most innocent and convenient is ipecacuanha, in the shape of lozenges, 2 or 3 of which may be sucked whenever the cough is troublesome. A light diet should be adopted, the bowels kept *slightly* relaxed by mild aperients, and a mild and equable temperature sought as much as possible. When this plan does not succeed, recourse may be had to an emetic, followed by small doses of Dover's powders, and extract or tincture of henbane, or squill pill. When a cough is troublesome at night, and unattended with fever, a small dose of laudanum, or tincture of henbane, taken on going to rest, will generally procure sleep. In the treatment of dry cough the more stimulating expectorants are useful, as garlic, ammoniacum, styrac, and benzoin, combined with narcotics and sedatives, as henbane, hemlock, and opium. A diaphoretic opiate is also very useful, especially in the cough of old people.

COUGH, POPULAR REMEDIES FOR. I. (*Draughts.*) *a.* Sirup of poppies 1 dessert-spoonful; antimonial wine 20 drops; mix for a dose, to be taken in a little warm tea on going to bed. *b.* Laudanum 30 drops; vinegar and honey, of each, a dessert-spoonful; ipecacuanha wine 25 drops; mix for one dose, as last.

II. (*Emulsion.*) Milk of almonds 4 oz.; sirup of squills and tolu, of each, 1 oz.; mix. *Dose.* A tablespoonful every 2 hours.

III. (*Mixtures.*) *a.* Tincture of tolu ½ oz.; paregoric elixir and tincture of squills, of each, ½ oz.; sirup of white poppies 1 oz.; mix. *Dose.* 1 teaspoonful in barley water, whenever the cough is troublesome. *b.* Milk of ammoniacum 4 oz.; sirup of squills 2 oz.; mix. A tablespoonful 3 or 4 times daily, for the cough of old persons. *c.* (*Dr. Munro's.*) Paregoric ½ oz.; sulphuric ether and tincture of tolu, of each, ¼ oz.; mix. *Dose.* A teaspoonful night and morning, or when the cough is troublesome, in a little warm water. *d.* (*Dr. Radcliff's.*) Sirup of poppies, sirup of squills, and paregoric, of each, ½ oz.; mix. *Dose.* As last.

COUMARINE. The fragrant volatile principle of the tonka bean, the diptera odorata of Wildenow. It is dissolved out by ether, and purified by alcohol. It crystalizes in small prisms.

COWHAGE. *Syn.* COWITCH. DOLICHI PUBES. The down which grows upon the pods of the mucuna pruriens. (Dolichos pruriens.) It occasions violent itching, when it comes in contact with the skin, which can only be allayed by a solution of given vitriol or oil. It is frequently administered as a vermifuge, made into a confection, by scraping the hair off a pod into treacle, sirup, or honey, for a morning dose, which is repeated for 3 or 4 successive days, followed by a brisk purge.

COWS, MILCH, (CHOICE OF.) As to a choice of breeds for a private family, none in England, (says Mr. Lawrence,) probably combine so many advantages as the Suffolk dun-cows. They excel both in quantity and quality of milk; they feed well after they become barren; they are small-sized, and polled or hornless; the last a great convenience. The horns of cows which butt and gore others, should be immediately broad tipped. There is a breed of polled Yorkshire, or Holderness cows, some of them of middling size, great milkers, and well adapted to the use of families, where a great quantity of milk is required, and where price is no object, and food in plenty. If richer milk and a comparison of the two famous breeds be desired, one of each may be selected, namely, the last mentioned, and the other of the midland county, or long-horned species. Color is so far no object, that neither a good cow nor a good horse can be of a bad color; nevertheless, in an ornamental view, the sheeted and pied stock of the Yorkshire shorthorns make a picturesque figure in the grounds.

The Alderney cows yield rich milk upon less food than larger stock, but are seldom large milkers, and are particularly scanty of produce in the winter season. They are, besides, worth little or nothing as barreners, not only on account of their small size, but their inaptitude to take on fat, and the ordinary quality of their beef.

Feeding. There is nothing equal to rich pasturage for milch cows, but at such seasons, and during such weather that this cannot be procured, good hay, with turnips, carrots, potatoes, or mangel-wurzel, must be given instead, along with a sufficient quantity of clean water. The principal cowkeepers of the metropolis have dairy-farms in the suburbs, where the animals are turned out a portion of every day in the year, except during heavy rains, or when the ground is covered with snow. They are also well supplied with brewers' grains, tares, beet-root, &c., and great care is taken that they get fresh air, and exercise sufficient for their health. Such cows yield a large quantity of wholesome milk, very different to much that is sold in London, obtained from cows kept in stables, cellars, and other confined situations, and which are seldom supplied with green food. It has lately been shown by Boussingault, that mangel-wurzel, so commonly used for feeding cattle, is insufficient as an article of food. He found that a cow fed on this substance ceases to give her usual quantity of milk, and that even when other food was given along with it, the animal yielded less than her ordinary quantity. Before giving turnips to cows, the rotten or bad ones should be picked out, as it is said that even the presence of a single damaged one will flavor the milk, and perhaps spoil a whole dairy of cheese or butter.

Economy of a cow. The annual consumption of food per cow, if turned to grass, is from an acre to an acre and a half in the summer, and from a ton to a ton and a half of hay in the winter. A cow may be allowed 2 pecks of carrots

perceive any good effects to result from its administration.

COPAIBIC ACID. *Syn.* Capivic Acid. The yellow brittle resin of balsam of copaiba. It is prepared by digesting the resin (left after distilling the oil from the balsam) in alcohol, which dissolves the acid resin, but leaves the viscid one. It may be purified by re-solution in alcohol. It forms about 50% of the balsam.

Prop. An amber-colored, brittle, semi-crystalline, resinous substance, soluble in alcohol, ether, and oils, reddens litmus paper, and forms salts with the bases, called copaivates. These may generally be made by dropping into a solution of the acid in alcohol, an alcoholic solution of a soluble salt of the base. The copaivates of potash, soda, and ammonia are easily prepared, by adding to an alcoholic solution of the acid another of the pure alkali, until it be neutralized, when the salts may be obtained by careful evaporation. Copaivate of silver is formed by neutralizing the acid with nitrate of silver, both being dissolved in alcohol, and then adding a little liquor of ammonia, when a white crystalline precipitate will subside. The copaivates of lead, lime, and iron, as well as several others, may be made in a similar manner.

Copaivate of magnesia may be made by adding copaivate of potassa to a solution of epsom salts. All these salts are easily decomposed by acids.

COPAL. *Syn.* Gum Copal. A resinous substance, which exudes spontaneously from the Rhus copallinum, and the Elæocarpus copalifer. When of good quality, it is too hard to be scratched by the nail, and has a conchoidal fracture. It dissolves with difficulty, and this, combined with its extreme hardness, renders it very valuable for making varnishes.

Solvents. I. *Caoutchoucine;* sparingly. II. Equal parts of *caoutchoucine* and *alcohol*, of ·825; freely soluble in the cold. III. *Absolute alcohol*, added gradually to the copal, previously rendered gelatinous by water of ammonia, assisting the union with heat. IV. *Alcohol* added to the copal, previously softened with ether. V. *Absolute alcohol* 1½ parts, digested on copal 1 part for 24 hours. (Unverdorben.) VI. *Alcohol*, to which a little camphor has been added. VII. *Ether;* and this solution may be diluted with alcohol. VIII. *Oils of rosemary* and *lavender*, (spike;) too expensive for general use. IX. *Copal*, heated until it fuses, acquires the property of dissolving in turpentine and alcohol. X. *Copal*, reduced to powder and exposed for some time to the air, also becomes soluble in alcohol and turpentine. XI. *Drying linseed oil*, at nearly the boiling point, dissolves copal, and will bear dilution with spirits of turpentine as soon as it has cooled sufficiently. This is the common way of making copal varnish. XII. *Ammonia* enables oil of turpentine to dissolve copal; but it requires such nice management of the fire, that it seldom succeeds completely. (Lewis.) XIII. *Powdered copal*, triturated with a little camphor, softens and becomes a coherent mass; and camphor, added either to alcohol or oil of turpentine, renders it a solvent of copal. ½ oz. of camphor is sufficient for 1 quart of oil of turpentine, which should be of the best quality; and the copal, about the size of a large walnut, should be broken into very small pieces, but not reduced to a fine powder. The mixture should be set on a fire so brisk as to make it boil almost immediately The vessel should be of tin or other metal, strong, shaped like a wine-bottle with a long neck, and capable of holding 2 quarts. The mouth should be stopped with a cork, in which a notch is cut to prevent the vessel from bursting. (Sheldrake.) XIV. A good varnish may be made by pouring upon the purest lumps of copal, reduced to a fine mass in a mortar, colorless spirits of turpentine, to about one third higher than the copal, and triturating the mixture occasionally in the course of the day. Next morning it may be poured off into a bottle for use. Successive portions of oil of turpentine may thus be worked with the same copal mass. (Varley, Tilloch's Mag. 51.)

⁂ In all the above cases the copal should be reduced to a *coarse* powder. A *fine* powder is apt to stick together and form hard lumps. The solution of copal, even in its most ready solvents, is attended with some difficulty, and frequently miscarries in the hands of the inexperienced. A mixture of caoutchoucine and alcohol (as in No. II.) is an exception.

COPAL, MELTED. Obtained by holding the gum before a good fire, so that as soon as the copal melts, it may drop into a pan of water: a kind of oil separates from it, and the copal becomes soluble in spirits of wine, and still more so if the melting is repeated.

COPAL, POWDERED. Copal reduced to powder and exposed to the air in a thin stratum, on sieves covered with paper, for 3 or 4 months. Soluble in alcohol.

COPPER. (From *cuprum*, a corruption of κύπρος, from the island of Cyprus, whence it was formerly brought.) A red-colored metal, too well known to require description.

Hist. Copper and its alloys appear to have been known to the most remote ages of antiquity. Brass, an alloy of copper, is mentioned by Moses (Job, xxviii.) upwards of 1600 years before the birth of Christ. (Hales.) This metal is found in the metallic state, and in combination with oxygen, sulphur, acids, and other minerals, and in the organic kingdom, in the ashes of plants, and in the blood of animals. (Sarzeau.) The copper of commerce is principally prepared from copper pyrites, a mixed sulphuret of iron and copper, found in Cornwall, and other parts of the world.

Prep. Copper is only prepared from its ores on the large scale. The copper pyrites is first roasted, and then smelted, by which process "*coarse metal*" is produced; this is again submitted to calcination and smelting, when "*fine metal*" is obtained. It afterwards undergoes the process of refining and toughening.

Prop. This metal is malleable and ductile. It has a specific gravity of 8·8 to 8·9, fuses at about 2000° Fahr., and volatilizes at higher temperatures. It forms numerous compounds, all of which are more or less poisonous.

Char. and Tests. The solutions of copper possess a blue or green color, and yield a blue precipitate with soda or potassa. Ammonia produces a bluish-white precipitato, soluble in an excess of the precipitant, forming a deep blue solution. Prussiate of potash gives a reddish-brown precipitate, sulphureted hydrogen and hydrosulphurets, a black

me. A polished iron plate, immersed in an acidulous solution of copper, becomes coated with that metal.

Estim. The quantity of copper present in any compound, may be estimated by throwing it down from its solution by pure potassa, after which it must be carefully collected, washed, dried, ignited, and weighed. This will give the quantity of the oxide from which its equivalent of metallic copper may be calculated; every 5 parts of the former being (as near as possible) equal to 4 of the latter. Copper may also be precipitated at once in the metallic state, by immersing a piece of polished steel into the solution, but this method will not give very accurate results. Copper may be separated from lead by adding sulphuric acid to the nitric solution, and evaporating to dryness, when water digested on the residuum will dissolve out the sulphate of copper, but leave the sulphate of lead behind. From this solution the oxide of copper may be thrown down as before. Copper may be separated from zinc by sulphureted hydrogen, which will throw down a sulphuret of copper, which may be dissolved in nitric acid, and treated as above.

Uses. The applications of copper in the arts are too well known to require notice. In medicine, 3 or 4 grains of the filings were formerly given in rheumatism, and to prevent hydrophobia.

Ant. Copper in the metallic state appears to be inert, but most of its compounds are poisonous. The antidotes are, the white of egg, milk, or flour mixed with water. Iron filings (Payen, Chevallier, Dumas) and the prussiate of potash have also been recommended. A drachm or more of the latter may be taken dissolved in water, and ½ oz. or more of the former, ad libitum. Sugar has also been proposed as an antidote. (Duval, Postel.)

COPPER, ALLOYS OF. With *zinc* copper forms *brass*; with *tin*, *bronze*, *bell*, and *cannon metal*. An alloy made with 100 parts of copper and 50 of tin, forms *speculum metal*. *White copper* is formed by the addition of metallic arsenic, and *German silver* is a mixture of nickel, zinc, and copper. See these articles in their alphabetical places.

COPPER, ACETATES OF. I. (*Neutral Acetate. Syn. Distilled Verdigris. Binacetate of Copper. Crystallized Verdigris.*) *Prep.* Dissolve verdigris in vinegar, with the aid of heat, and crystallize. It forms dark green or blue crystals.

II. (*Diacetate. Syn. Verdigris. Ærugo.*) Formed by exposing sheets of copper to the vapor of acetic acid, in a warm situation. (See Verdigris.) It forms a green or bluish-green powder.

III. (*Sesquibasic Acetate.*) The blue portion of verdigris, soluble in water.

IV. (*Trisacetate.*) The green insoluble portion of verdigris.

COPPER, ARSENITE OF. *Syn.* Scheele's Green. *Prep.* Mix a solution of 2 parts of sulphate of copper in 44 of water, with a solution of 2 parts of potash of commerce, and 1 of pulverized arsenious acid, also in 44 of water. Both solutions being warm, the first is to be gradually poured into the second. The grass-green insoluble precipitate is to be washed with water.

COPPER, AMMONIURETED. *Syn.* Cupro-sulphate of Ammonia. Ammoniated Copper, (P. E.) *Prep.* (*Ammonio-sulphate of Copper,* P. L.) Sulphate of copper ℥j; sesquicarbonate of ammonia ℥iss. Rub them together until carbonic acid ceases to evolve, then wrap it up in bibulous paper and dry it in the air.

Prop. By heat ammonia is evolved, and oxide of copper remains. Its aqueous solution changes the color of turmeric, and a solution of arsenious acid renders it green. (P. L.)

Uses. Employed in pyrotechny. It has been given in doses of ½ to 5 grs. in chorea, epilepsy, hysteria, &c., but it is principally employed as an injection and as a collyrium, in opacity of the cornea.

Remarks. Great care must be taken in drying this article, as it is apt not only to lose a large portion of its weight, but become of an inferior color. Both the ingredients should be separately reduced to powder before mixing.

COPPER, BEAN-SHOT. *Prep.* Melt copper, and pour it in a small stream into boiling water. It is in small lumps like peas or beans, hence its name.

COPPER, BLANCHED. *Prep.* Fuse copper with $\frac{1}{18}$ of its weight of neutral arsenical salt, under a flux of calcined borax, charcoal, and powdered glass.

COPPER, CARBONATE OF. *Syn.* Dicarbonate of Copper. Mineral Green. *Prep.* Add a solution of carbonate of soda or potassa to a hot solution of protosulphate of copper.

Remarks. The beautiful green mineral called *malachite*, is a hydrated dicarbonate of copper. If the solution of copper in the above formula be employed cold, the precipitate has a bluish-green color. (See Verditer.)

COPPER, CHLORIDES OF. *Prep.* I. (*Subchloride. Syn. Dichloride of Copper. Resin of ditto. White muriate of ditto.*) Distil a mixture of 1 part of copper filings, with two parts of corrosive sublimate.

II. (*Chloride. Syn. Muriate of Copper. Hydrochlorate of ditto. Protochloride of ditto.*) Dissolve protoxide of copper in muriatic acid, evaporate and crystallize.

Remarks. This salt forms green needles, is deliquescent, soluble in alcohol, and when heated, (under 400°,) loses its water, and becomes anhydrous chloride of copper, and assumes the form of a yellow powder. The first of these preparations is sometimes called the protochloride or muriate; the second the deutochloride.

COPPER, CHROMATE OF. *Prep.* Precipitate a salt of copper, with neutral chromate of potash; or dissolve hydrated peroxide or carbonate of copper in chromic acid. Caustic ammonia dissolves this salt, forming a magnificent dark-green liquid, from which, by the admixture of spirit of wine, ammonio-chromate of copper, or cupro-chromate of ammonia, is disengaged in the form of a powder of a splendid, rather dark-green appearance. The readiest way of preparing this permanent and beautiful color, is to add solution of chromate of potash to ammoniacal sulphate of copper.

COPPER, FEATHER-SHOT. *Prep.* Melted copper, poured in a small stream into cold water. It forms small pieces, with a feathered edge, hence the name. It is used to make solution of copper.

sale druggist in the city, produces an excellent article.

II. Hay saffron, cassia, and turmeric, of each 4 oz.; cardamoms 1 oz.; starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oil of nutmegs 2 drachms; oil of cloves 3 drachms. Reduce the dry ingredients to fine powder, and pass it through an 80 hole sieve, then add the oils, and after well mixing, pass it through a coarse sieve, (about 40 holes to the inch,) to ensure the whole being perfectly mixed.

The following form produces a powder possessing great depth and brilliancy of color.

III. Hay saffron 4 oz.; turmeric 3 oz.; powdered starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oils of cloves and cassia, of each 3 drachms; oil of nutmegs 2 drachms; essence of cardamoms 1 oz. *Proc.* Boil the saffron and turmeric in 1 gallon of water, placed in a bright copper pan, for 10 minutes, then, without straining, add the chalk, starch, and sugar; mix well, and continue stirring until the mixture becomes quite stiff, then break it up and dry it until fit for powdering. This must be performed in a water or steam bath. To the powder, passed through a fine sieve, as before, the oils and tincture must be added, and after being well mixed, and passed through a coarse sieve, it should be placed in a jar or bottle, and bunged up close.

Remarks. In the wholesale trade this article is kept under two forms: one in powder, as ordered by the College, and commonly called, for distinction sake, "*pulvis confectionis aromaticæ;*" the other mixed up ready for use. In preparing the latter, it is a common plan to make a strong infusion or decoction of the saffron, and to use it to mix up the other ingredients. Some persons follow the method described in the last formula, mixing up the powder to a proper consistence with water before adding the aromatics. When the price of *precipitated* chalk is an objection to its use, *prepared* chalk may be used instead. This confection is cordial, stimulant, and antacid. *Dose.* 10 to 60 grs.

CONFECTION OF BLACK PEPPER. *Syn.* Ward's Paste. *Prep.* (*Confectio Piperis Nigri*, P. L.) Black pepper and elecampane root, of each lb. j; fennel seed lb. iij; honey and white sugar, of each lb. ij; mix.

Remarks. The common practice is to keep the dry ingredients ready mixed in a bottle, and only to add the honey as wanted. The proportions are 2 parts of the latter to 7 of the mixture. The *dose* is 1 to 2 drachms 2 or 3 times a-day, in piles, fistula, &c. It should be persevered in for 2, 3, or 4 months, (Sir B. Brodie;) and as it is apt to accumulate in the bowels, its use should be accompanied by mild aperients. (Pereira.)

CONFECTIONS OF CASSIA. *Syn.* Electuarium Cassiæ, (P. L. 1788.) *Prep.* (*Confectio Cassiæ*, P. L.) Fresh cassia pulp lb. ss.; manna ℥ij; tamarind pulp ℥j; sirup of roses f℥viij. Bruise the manna and dissolve it in the sirup, then add the pulps and evaporate to a proper consistence.

CONFECTION OF HEMLOCK. (Dr. Osborne.) *Prep.* Fresh leaves of hemlock and moist sugar equal parts; beat them to a confection in a mortar.

CONFECTION OF OPIUM. *Syn.* Philonium Romanum, (P. L. 1720.) Ditto Londinense, (P. L. 1745.) Confectio Opiata, (P. L. 1788.) Ditto Opii, (P. L. 1809, and since.) *Prep.* (P. L.) Powdered opium ʒvj; long pepper ℥j; ginger ℥ij; caraways ℥iij; tragacanth ʒij; all in fine powder; sirup f℥xvj. Mix.

Use and Dose. This confection is intended as a substitute for the *mithridate* and *theriaca* of the old Pharmacopœia. It is stimulant and narcotic, and is given in flatulent colic and diarrhœa unaccompanied by fever. The dose is from 15 to 50 grs.

CONFECTION OF ORANGE PEEL. *Syn.* Conserva flavedinis Corticum Aurantiorum, (P. L. 1720 and 1745.) Ditto Corticis exterioris Auranthi Hispalensis, (P. L. 1788.) Ditto Aurantiorum, (P. L. 1824.) Ditto Aurantii, (P. L. 1809 and 1836.) *Prep.* (P. L.) The external rind of the fresh orange, separated by rasping, lb. j; white sugar lb. iij. Beat the rind in a stone mortar with a wooden pestle, then add the powdered sugar, and beat the mixture until the two are perfectly incorporated.

Remarks. This confection is tonic and stomachic, and is principally used as a vehicle for the exhibition of tonic powders.

CONFECTION OF PEPPERMINT. *Prep.* Green peppermint 4 oz.; powdered white sugar 12 oz.; beat them together as last.

Use. Anti-emetic and flatulent. Given in colic, &c., in the form of a bolus, or made into a mixture.

CONFECTION OF THE DOG ROSE. *Syn.* Confection of Hips. Conserva Fructus cynosbati, (P. L. 1720 and 1745.) Ditto Cynosbati, (P. L. 1788.) Ditto Rosæ Caninæ, (P. L. 1809, and since.) *Prep.* (P. L.) Pulp of the dog rose lb. j; powdered refined sugar ℥xx; mix by a gentle heat in an earthen vessel.

II. Pulped hips 2 cwt.; fine white sugar 2½ cwt.; incorporate them without applying heat.

Remarks. Both this and the following confection has a brighter color, if made without heat, or touching metallic vessels. On the small scale it is made by beating the ingredients together in a marble mortar, but in large quantities by grinding in a mill. It is slightly laxative, and is principally used for forming pills. It candies by keeping.

CONFECTION OF THE RED ROSE. *Syn.* Conserva Rosarum Rubrarum, (P. L. 1745.) Ditto Rosæ, (P. L. 1788.) Ditto Rosæ Gallicæ, (P. L. 1809 and 1824.) Confectio Rosæ Gallicæ, (P. L. 1836.) *Prep.* (P. L.) Petals of the red rose lb. j; refined sugar lb. iij; beat the petals in a stone mortar, then add the sugar, and again beat until thoroughly incorporated.

Remarks. On the large scale this is prepared like the confection of hips. It is astringent and tonic, and principally used for forming pills. If taken alone, the dose is 1 to 2 drachms.

CONFECTION OF RUE. *Syn.* Electuarium e Boccis Lauri, (P. L. 1720, 1745.) Confectio Rutæ, (P. L. 1809, and since.) *Prep.* (P. L.) Dried rue, caraway, and laurel berries, of each ℥iss; sagapenum (true) ℥ss; black pepper ʒij; honey ℥xvj. Reduce the dry ingredients to very fine powder, and when wanted for use, make them into a confection with the honey.

Use, &c. It is antispasmodic; in enemas 30 to

60 grs., with half a pint of gruel, for flatulent colic, &c.

CONFECTION OF SCAMMONY. *Syn.* ELECTUARIUM CARYOCOSTINUM, (P. L. 1720.) DITTO E SCAMMONIO, (P L. 1745.) DITTO SCAMMONII, (P. L. 1809 and 1788.) CONFECTIO SCAMMONEÆ, (P. L. 1809 and 1824.) *Prep.* (*Confectio Scammonii* P. L.) Scammony ℥iss; cloves and ginger, of each, ʒvj; oil of caraway fʒss. Reduce the ingredients to a very fine powder, and when wanted for use, make them into a confection with sirup of roses, and lastly add the oil.

Use, &c. Cathartic in doses of 10 to 30 grs.

CONFECTION OF SENNA. *Syn.* LENITIVE ELECTUARY. ELECTUARIUM SENNÆ, (P. L. 1788.) CONFECTIO SENNA, (P. L. 1809, and since.) *Prep.* (P. L.) Senna ℥viij; figs lb. j; pulp of tamarinds, prunes, and cassia, of each, lb. ss.; coriander seeds ℥iv; liquorice ℥iij; sugar lb. iiss; water 3 pints. *Proc.* Rub the senna and corianders in a mortar, and separate by sifting ℥x of the mixed powders. Boil the figs and liquorice in the water, until reduced to one half; then press and strain the liquor. Evaporate the strained liquor until only 24 fluid ounces remain, then add the sugar, and when dissolved, mix in the pulps, and lastly the powder.

Use, Dose, &c. Confection of senna is a gentle and pleasant purgative, and well adapted for persons suffering from piles, and as a laxative during pregnancy. The dose is ¼ to ½ oz. taken at bedtime or early in the morning.

Remarks. Perhaps there is no one pharmacopœial preparation which it is more difficult to obtain of good quality than the above. The absolute cost of an article prepared according to the directions of the College, will be somewhere about 1s. 9*d.* per lb.; but there are many wholesale drug houses vending confection of senna, which they warrant as genuine, at from 9*d.* to 1*s.* a pound. Dr. Paris (in his Pharmacologia) very truly remarks, that "the directions of the Pharmacopœia are very rarely followed." I understand that considerable quantities are manufactured, into which unsound and spoiled apples enter as a principal ingredient. The following forms are, to my knowledge, employed by some members of the trade.

II. Powdered senna, pulp of tamarinds, cassia, and prunes, of each, 1½ lb.; powdered corianders ¾ lb.; Spanish juice ½ lb.; simple sirup 12 lbs.

III. As the above, omitting the cassia pulp, and adding 2 lbs. more tamarind pulp.

Both these articles are labelled P. L., and sent out as genuine, and that when no competition as to price exists. The cheaper article is made as follows:

IV. Common prunes and tamarinds, of each, 16 lbs.; treacle ¾ cwt.; species (a compound of senna dust and small senna, mixed with 3 lbs. of coriander seeds, and strengthened with jalap, all ground to a fine powder) 18¾ lbs. To this is frequently added ¼ cwt. of rotten or inferior apples, which are pulped with the prunes and tamarinds. This article is not unfrequently labelled "CONF. SENNÆ VER." by the conscientious tradesman.

CONFECTION OF SULPHUR, (COMPOUND.) *Prep.* (St. B. H.) Precipitated sulphur ℥ss; cream of tartar ʒj; honey ℥j; mix As a laxative in piles, &c. *Dose.* ℥ss.

CONFECTION OF STEEL. *Syn.* CONFECTION OF CARBONATE OF IRON. *Prep.* Confection of orange-peel and sesquioxide of iron, (P. L.,) of each, 4 oz.; powdered white sugar 6 oz.; simple sirup 2 oz.; mix. Aromatic and tonic. *Dose.* A teaspoonful to ½ oz. twice or thrice daily.

CONGELATION, (from *congelo*, to freeze.) IN CHEMISTRY. The conversion of a liquid into a solid state, by the action of cold.

The production of an extreme degree of cold is often of the utmost importance in chemical operations, and an easy method of doing so is consequently a desideratum. The means hitherto adopted for this purpose have either depended upon the sudden liquefaction of solids, or the abstraction of heat by rapid evaporation. The loss of sensible heat, by the first method, is the basis of the various processes of producing cold by what are commonly called freezing mixtures, all of which act upon the principle of liquefying solid substances without supplying heat. The caloric of liquidity being in these cases derived from that previously existing in the solid itself in a sensible state, the temperature must necessarily fall. The degree of cold produced, depends upon the quantity of heat which is thus diffused through a larger mass, or which, as it were, disappears, and this is dependent on the quantity of solid matter liquefied, and the rapidity of the liquefaction. Saline compounds are the substances most frequently employed, and those which have the greatest affinity for water, and thus liquefy the most rapidly, produce the greatest degree of cold. Thus it is, that chloride of calcium and nitrate of ammonia, when dry and in fine powder, if suddenly mixed with water, produce extreme cold. The latter, suddenly mixed with an equal weight of water at 50°, will sink the thermometer to +4°, or 28° below the freezing point. The most common and convenient freezing mixture, when snow can be procured, is formed by mixing 2 parts of that substance with 1 part of sea-salt. This will sink the thermometer to —5°, or 37° below the freezing point of water. Equal parts of these substances produce a degree of cold marked by the zero of Fahrenheit's thermometer, and is the standard taken for graduating that instrument. Mr. Walker, a gentleman who fully investigated this subject, recommends the following proportions for the production of extreme cold.

PEAU. BEZETTA CŒRULEA. *Prep.* I. Color pieces of clean linen with auvergne or ground archel, (lichen parellus.)

II. Dip pieces of clean linen into the juice of mulberries, blood-red grapes, lees of red wine, &c.

Use. To color jellies and confectionary, and the rind of cheeses.

CLARIFICATION. This word (from *clarus*, clear, and *facio*, I make) means, properly, any process of freeing a fluid from heterogeneous matter, and thus includes filtration. In its commoner sense, however, it is applied to the process of clearing liquids by the addition of some substance that either inviscates the feculous matter, and subsides with it to the bottom, or, that induces such a change in its nature or bulk, that it subsides by its own density, in each case leaving the liquor transparent. Albanum, gelatin, acids, certain salts, blood, lime, plaster of Paris, alum, heat, alcohol, &c., serve in many cases for this purpose. The first is used under the form of white of egg, for the clarification of sirups, as it combines with the liquid when cold, but on the application of heat, rapidly coagulates and rises to the surface, carrying the impurities with it, forming a scum which is easily removed with a skimmer. It is also much used for fining wines and liqueurs, particularly the red wines and more limpid cordials. Gelatin, under the form of isinglass, dissolved in water, or weak vinegar, is used to fine white wines, beer, cider, and similar liquors, that contain a sufficient quantity of either spirit or astringency (tannin) to induce its precipitation. Sulphuric acid is frequently added to weak liquors for a similar purpose, either alone, or after the addition of white of egg, or gelatin, both of which it rapidly throws down in an insoluble form. A pernicious practice exists among some unprincipled parties, of using certain salts of lead and potash to clear their liquors, especially those that are expected to sparkle in the glass, as cordial, gin, &c. For this purpose, a little sugar of lead, dissolved in water, is first mixed up with the fluid, and afterwards about half its weight of sulphate of potash, also dissolved in water, is added, and the liquor is again roused up. By standing, the sulphate of lead, formed by this mixture, subsides, and leaves the liquor clear. Blood is used in the same way as isinglass or white of eggs, for fining red wines, beer, and porter. Lime, alum, alcohol, and heat, act by curdling or coagulating the feculencies, and thus, by increasing their density, induce their subsidence. Plaster of Paris acts partly like the above, and partly like albumine, or gelatin, by enveloping and forcing down the suspended matter. Sand is often sifted over liquors for the simple purpose of acting by its gravity, but appears to be quite useless. The juices of plants are clarified by heat, which coagulates the albumine they contain. Marl, or clay, is frequently used to clear cider and perry. A strip of isinglass is generally employed to clarify coffee. (See WINES, BREWING, CORDIAL, COFFEE, INFUSION.)

CLEANING. The best way to clean a house is to *keep it clean* by a daily attention to small things, and not allow it to get into such a state of dirtiness and disorder as to require great and periodical cleanings. Some mistresses, and also some servants, seem to have an idea that a house should undergo "regular cleanings," or great washing and scrubbing matches once every three or six months, on which occasions the house is turned almost inside out, and made most uncomfortable. All this is bad economy, and indicates general slovenliness of habits. (Chambers.)

CLEAR-STARCHING. This is practised as follows: "Rinse the articles in three waters, dry them, and dip them in a thick starch, previously strained through muslin; squeeze them, shake them gently, and again hang them up to dry; and when dry, dip them twice or thrice in clear water, squeeze them, spread them on a linen cloth, roll them up in it, and let them lie an hour before ironing them. Some persons put sugar into the starch to prevent it sticking while ironing, and others stir the starch with a candle to effect the same end; we object to these practices as injurious to the article starched, or as very nauseous. The best plan to prevent sticking is to make the starch well, and to have the irons quite clean and highly polished."

CLOTH, CLEANING AND SCOURING OF. The common method of cleaning cloth is by beating and brushing, unless when very dirty, when it undergoes the operation of scouring. This is best done on the small scale, as for articles of wearing apparel, &c., by dissolving a little curd soap in water, and, after mixing it with a little ox-gall, to touch over all the spots of grease, dirt, &c., with it, and to rub them well with a stiff brush until they are removed, after which the article may be well rubbed all over with a brush or sponge dipped into some warm water, to which the previous mixture and a little more ox-gall has been added. When this has been properly done, it only remains to thoroughly rinse the article in clean water until the latter passes off uncolored, when it must be hung up to dry. For dark-colored cloths the common practice is to add some fuller's earth to the mixture of soap and gall. When *nearly* dry, the nap should be laid right, and the article carefully pressed, after which a brush, moistened with a drop or two of olive oil, should be several times passed over it, which will give it a superior finish. Cloth may also be cleaned in the dry way as follows:—First, remove the spots as above, and, when the parts have dried, strew clean damp sand over it, and beat it in with a brush, after which brush the article with a hard brush, when the sand will readily come out, and bring the dirt with it. *Black cloth* which is very rusty, should receive a coat of reviver after drying, and be hung up until the next day, when it may be pressed and finished off as before. *Scarlet cloth* requires considerable caution. After being thoroughly rinsed, it should be repeatedly passed through cold spring water, to which a tablespoonful or two of solution of tin has been added. If much faded, it should be dipped in a scarlet dye-bath. *Buff cloth* is generally cleaned by covering it with a paste made with pipe-clay and water, which, when dry, is rubbed and brushed off.

Fruit spots and similar stains may frequently be removed by holding the part over a common brimstone match, lighted, or by water acidulated with a little salt of lemons, oxalic or muriatic acid; but care must be taken not to apply this liquid to colors that it will injure.

The stains of acids may be removed by washing the part with a little spirits of hartshorn or

liquid ammonia; *those of alkalis*, by water acidulated with lemon juice or tartaric acid.

Grease spots may generally be taken out by means of a little soft soap; or, if the color be delicate, or a false dye, a little ox-gall or curd soap will be better. These must be used as above described. *Stains of painters' oils, wax, paints, or varnishes*, will not usually yield to the above plan; in these cases, a simple way is to soak the part in spirits of turpentine, and, when softened, to wash it off with the same fluid. Ether or essential oil of lemons will also quickly remove these spots, but is too expensive for general use.

CLOTH, INCOMBUSTIBLE. This is made of fibres of asbestos by weaving. It will bear a considerable heat without injury. Cotton and linen fabrics prepared with a solution of sal ammoniac, or phosphate of ammonia, may be placed in contact with ignited bodies without danger. They will carbonize, but not inflame. Solutions of alum, sea salt, &c., have been used for the same purpose. It is by a knowledge of this property of ordinary salt, that jugglers are enabled to perform the common trick of burning a thread of cotton while supporting a ring or a key, without the latter falling to the ground. The cotton is reduced to a cinder, but, from the action of the salt, its fibres still retain sufficient tenacity to support a light weight.

CLOTH, RENOVATION OF. The article undergoes the process of scouring before described, and, after being well rinsed and drained, it is put on a board, and the threadbare parts rubbed with a half-worn hatter's card, filled with flocks, or with a teazle or a prickly thistle, until a nap is raised. It is next hung up to dry, the nap laid the right way with a hard brush, and finished as before. When the cloth is much faded, it is usual to give it a "dip," as it is called, or to pass it through a dye-bath, to freshen up the color.

CLOTHES, BRUSHING AND PRESERVATION OF. If very dusty, hang them on a horse or line, and beat them with a cane; then lay them on a clean board or table, and well brush them, first with a stiff brush, to remove the spots of mud and the coarsest of the dirt, and next with a softer one, to remove the dust and to lay the nap properly. If clothes be wet and spotted with dirt, dry them before brushing, and then rub out the spots with the hands. The hard brush should be used as little as possible, and then with a light hand, as it will, if roughly and constantly employed, soon render the cloth threadbare. Should there be spots of tallow-grease on the clothes, take it off with the nail, or, if that cannot be done, have a hot iron with some thick brown paper, lay the paper on the part where the grease is, then put the iron upon the spot; if the grease comes through the paper, put on another piece, till it ceases to soil it.

After the clothes are brushed, they should be hung up in a clean place, free from dust, if wanted for immediate use; but if intended to remain unused for some time, they should be placed away on the shelves of the clothes' closet or wardrobe. The latter should always be in the driest situation possible, as if the clothes be exposed to the least damp, they not only acquire an unpleasant smell, but gradually become rotten.

CLOVES. The flower buds of the eugenia caryophyllata, dried and smoked. It is a common practice to adulterate this spice in the same manner as cinchona bark. Cloves from which the oil has been distilled are dried and rubbed between the hands, previously moistened with a little sweet oil, to brighten their color, after which they are mixed up with fresh spice for sale.

COACH ACCIDENTS. "Should the horses run off, in defiance of all restraint, while you are in a coach, sit perfectly still, and in anticipation of the possible overturn, keep your legs and arms from straggling. Sit easily and compactly, so that, when upset, you will gently roll over in the direction you are thrown. We have seen ladies in these circumstances scream wildly, and throw their arms out of the windows, thus exposing themselves to the chance of broken limbs. If run away with in a gig, either sit still collectedly, or drop out at the back, so as to fall on your hands. Never jump from a rapidly-moving vehicle, unless (supposing it impossible to slip down behind) you see a precipice in front, in which case any risk of personal damage is preferable to remaining still. The Duke of Orleans lost his life by neglecting these simple precautions."

COAK. *Syn.* COKE. CHARRED COAL. MINERAL CHARCOAL. Carbonized coal. The principle of its manufacture is similar to that of charcoal. There are three varieties of coak, viz.

I. (*Kiln-made coak. Stifled coak.*) Made by burning the coal in a pile, kiln, or stove. It has a dull black color, and produces an intense heat when used as fuel. The coal is frequently burnt in a series of shallow stoves, with as little access of air as will support the combustion, and the smoke conducted through proper horizontal tunnels to a capacious brick chamber, 100 yards or more in length, kept as cool as possible by a stream of water passing over its roof, or by a shallow pond resting on it. Here the bituminous vapors are condensed in the form of tar, along with a considerable quantity of crude ammoniacal salt. Common coal yields about 3§ of tar when treated in this way, but some strong bituminous coal will give $\frac{1}{7}$ or $\frac{1}{8}$ of its weight. This tar, when inspissated, gives 75§ of pitch, and 20 to 24§ of a crude species of naphtha, that is excellent for out-door painting. The ammonia is made into sal ammoniac. The *screenings*, or dust-coal, separated from the better kinds of bituminous coal, is the sort commonly used for making coak in ovens.

II. (*Gas coak. Distilled coak.*) The cinder left in the retorts after the gas has been distilled off. Its color is gray, and it only produces a weak heat in burning, not sufficient to smelt iron.

III. (*Slate coak. Carbon mineral.*) From bituminous slate, burned in covered iron pots, in a similar way to that adopted for making bone-black. Also burnt in piles. It is black and friable. Used to clarify liquids, but vastly inferior to bone-black, and does not abstract the lime from sirups.

COBALT. *Syn.* REGULUS OF COBALT. A metal discovered by Brandt, in 1733. It is found in ores, associated with arsenic and other metals, and is constantly present in meteoric iron.

Prep. Dissolve oxide of cobalt in muriatic acid, and pass sulphureted hydrogen gas through the solution, until all the arsenic is thrown down; filter and boil with a little nitric acid, then add an ex-

cess of carbonate of potassa, and digest the precipitate in a solution of oxalic acid to remove any oxide of iron; wash and dry the residuum, which is the pure oxalate, and expose it to heat, either in a retort or crucible, from which the air is excluded, when *pure metallic cobalt* will be obtained.

II. Mix equal parts of oxide of cobalt and soft soap, and expose them to a violent heat in a covered crucible.

III. Roast Cornish cobalt ore, then powder it, and smelt it with twice its weight of soft soap.

Remarks. Cobalt is seldom employed in the metallic state, from the great difficulty of reducing its ores, but its oxide is largely used in the arts. It has been said to form three compounds with oxygen, but only one—the black or peroxide—is employed. It forms salts with the acids, which are interesting from the remarkable changes of color which they exhibit. The *sulphate* is formed by boiling sulphuric acid on the metal, or by dissolving the oxide in the acid. It forms reddish crystals, soluble in 24 parts of water. The *nitrate*, made in a similar way, forms deliquescent crystals. The *muriate* may be made by dissolving the oxide in muriatic acid; the neutral solution is blue when concentrated, and red when diluted; the addition of a little acid turns it green. Dissolved in water, it forms a *sympathetic ink*, the traces of which become blue when heated, but if the salt be contaminated with iron, they become green. (Klaproth.) The addition of a little nitrate of copper to the above solution, forms a sympathetic ink, which by heat gives a rich greenish-yellow color. (Ure.) The addition of a very little common salt makes the traces disappear with greater rapidity, on the withdrawal of the heat. The *acetate* forms an ink which turns blue when heated. The *oxalate* and *phosphate* may be formed by digesting the oxide in a solution of the acid, or by double decomposition. The latter salt is an insoluble purple powder, which, when heated along with 8 times its weight of gelatinous alumina, produces a blue pigment, almost equal in beauty to ultramarine. With sulphur cobalt unites, forming a sulphuret, and with phosphorus a phosphuret.

Char. and Tests. The neutral salts of cobalt form red solutions, turning green on the addition of an excess of the acids, and giving a blue-colored precipitate with the alkalis, unless arsenic be present, when the color will be brown. Their solutions are unaffected by sulphureted hydrogen, but hydro-sulphuret of ammonia throws down a black powder, soluble in an excess of the precipitant. If the solution contain arsenic, a yellow powder is first precipitated, after which the filtered fluid will remain unaffected by sulphureted hydrogen gas. Tincture of galls gives a yellowish-white precipitate, and the solution of oxalic acid a red one.

COBALT, OXIDE OF. *Syn.* Black Oxide of Cobalt. Cobalt Black. *Prep.* To a solution of muriate of cobalt, add another of carbonate of potassa as long as it produces a precipitate; filter, wash, and dry.

II. Boil powdered bright-white cobalt ore (from Cornwall) in nitric acid; dilute with a large quantity of water, and add a solution of carbonate of potassa, very gradually, until the clear liquor, after the impurities have settled, becomes of a rose color: then add the potash water as long as a precipitate falls; wash and dry.

Use. To make blue colors for painters, enamellers, and potters. In medicine it has occasionally been used as a remedy for rheumatism.

COCCULUS INDICUS. The fruit of a shrub (the menispermum cocculus) which abounds on the sandy shores of Malabar, and other parts of the East Indies. It contains about 2§ of picrotoxin, a peculiar vegetable principle, possessing very poisonous properties. It also contains menispermine and paramenispermine. (Pelletier and Couerbe.) A small portion of this dangerous drug is used by poachers, and a still smaller quantity to destroy vermin, the remaining, and by far the greater part, being used to adulterate beer and wine. It forms a profitable article of trade to the wholesale druggist, who is enabled to sell it at a high price to brewers, from its being a contraband article. The use of cocculus indicus in brewing is no secret, as several writers have openly recommended its use. One of these conscientious gentlemen states, that "it is impossible with pure malt and hops alone, to produce a strong-bodied porter;" he therefore recommends the use of "cocculus indicus, grains of Paradise, and nux vomica." (Childe, on Brewing.) Another author, with the most unblushing effrontery, actually gives full directions for its use. He orders 3 lbs. of cocculus to be used for every 10 quarters of malt, and adds, "it gives an inebriating quality, which passes for strength of liquor; it prevents second fermentation in bottled beer, and consequently, the bursting of the bottles in warm climates." (Morrice's Treatise on Brewing.) It is really disgusting to find that men can so degrade themselves, as thus publicly to recommend a wholesale system of slow poisoning. The conscientious brewer, who understands the art which he professes, finds no difficulty in producing "a strong-bodied porter" from malt and hops alone. It is only persons whose cupidity induces them to reduce the quantity of malt and hops required for the production of good liquor, that encounter any difficulty in so doing. There is a penalty of 200*l.* upon the brewer for purchasing or having in his possession any ingredient for the adulteration of beer, and there is a penalty of 500*l.* upon the seller of such ingredients. Yet, in defiance of these heavy fines, the trade in these articles is unabated, though carried on in a clandestine manner. The general way this is managed, is to pack the drug in common soda barrels, and to place 3 or 4 inches of small crystals of Scotch soda at the bottom and top of the cask. In this way the package readily passes off as a cask of common soda, and even should it be opened, the alkali would first present itself to view, and thus satisfy the examiner. Another way commonly adopted, is to form it into an extract, known by the name of B. E., or *black extract*, which is *ostensibly* prepared for tanners, but its real destination is the beer cask. The store of a certain druggist, which came under my examination some short time since, contained an immense number of bags of this article; in fact, it formed at least one fourth of the entire stock.

COCHENILLIN. *Syn.* Cochineal Red. Carminium. Carminia. Pure Carmine. The coloring principle of cochineal. The carmine of commerce consists of cochenillin, combined with a

tile animal matter and an acid, from which it may be nearly purified by solution in liquid ammonia, and precipitations by acetic acid, mixed with alcohol. Cochenillin may also be prepared by evaporating a watery infusion of cochineal to the consistence of sirup, dissolving this in proof spirit, filtering, again evaporating, and dissolving the residuum in liquid ammonia as before. It is turned orange by acids, and violet by alkalis. It has been obtained under the form of reddish-purple crystalline grains.

COCKLE POWDER. Cockles pulped through a sieve, made into a paste with flour, and a little salt, and then rolled out into thin pieces and dried. It is next reduced to powder, sifted, and packed in well-corked bottles. *Use.* To make sauce, (about ½ oz. to ½ pint.)

COCOA. I. The roasted husks of the cacao, or chocolate bean, reduced to powder by grinding.

II. The cake left after expressing the oil from the beans.

COCOA, PATENT. The cacao nut roasted and ground. (including the husks.)

COCOA, FLAKED. Ground cocoa strongly compressed, and flaked with a sharp knife or machine.

COCOA, SOLUBLE. Cocoa ground to a very fine powder, and mixed with sugar. It is thus rendered miscible with boiling water.

Remarks. Cocoa forms a very wholesome beverage, especially for breakfast. Much of the cheap stuff sold under this name is very inferior, being made with damaged nuts that have been pressed for the oil, mixed with potato flour, mutton suet, &c. Trash of this kind is frequently ticketed in the shop windows of London at 6*d.* to 8*d.* a pound. (See CHOCOLATE.) The nut of the palma cocos is commonly confounded with that of the theobroma cacao. The latter is the small chocolate bean, while the former is the large nut, filled with a refreshing milky juice.

COD. This excellent fish is in season from the beginning of October to the end of April. It should be chosen by the redness of the gills, freshness of the eyes, and the whiteness and firmness of the flesh. The best fish are very thick about the neck. It is generally cooked by boiling, but is sometimes baked, or cut into slices and broiled or fried. Cod's head and shoulders, with oyster sauce, is a favorite dish. Shrimp and anchovy sauce are also good additions. The flesh of the cod is often split and dried, (dried cod,) or salted. The fish so largely imported from Newfoundland are cod, beheaded, split open, gutted and salted. They are caught by millions on the "Grand Bank." Cod-sounds are pickled in brine and also made into isinglass. The liver is boiled for its oil, and the spawn made into caviare.

CODEIA. *Syn.* CODEINE. An alkaloid discovered by Robiquet associated with morphia.

Prep. Dissolve commercial hydro-chlorate of morphia in water, precipitate with ammonia, evaporate and crystallize. The product is a double salt of morphia and codeine, and when digested with warm liquor of potassa gives up its morphia. It may be further purified by solution in ether, and by the addition of a little water and spontaneous evaporation may be obtained quite pure and in a crystalline state.

Prop. Soluble in alcohol, ether, and water. Its solution in the latter, by slow evaporation, yields large transparent octohedrons. With the acids it forms crystallizable salts. These possess the singular property of producing a general and violent itching of the surface of the body when administered internally. The same symptoms frequently follow the exhibition of opium and muriate of morphia, and are referred to the presence of a salt of codeia. (Gregory.) The commercial muriate frequently contains 3 to 4⅝ of codeia.

Char. and Tests. It is distinguished from *morphia* by not becoming blue on the addition of the sesquichloride of iron, nor turning red with nitric acid, and by not being precipitated by ammonia, when dissolved in muriatic acid and mixed with a large quantity of water. Unlike morphia, it is insoluble in liquor of potassa and is soluble in ether. The salts of codeia may also be known by tincture of galls throwing down a copious precipitate from their solutions, but this does not occur in the salts of morphia. It may be distinguished from meconine by its aqueous solution showing an alkaline reaction with test paper.

COFFEE. The berry of the coffæa Arabica. II. A decoction or infusion prepared therefrom.

Qual. Coffee promotes digestion and exhilarates the spirits, and when strong generally occasions watchfulness, but in some phlegmatic constitutions induces sleep. Drunk in moderation, especially if combined with sugar and milk, it is perhaps the most wholesome beverage known. The various qualities that have been ascribed to it by some persons, such as dispelling or causing flatulency, removing dizziness of the head, attenuating the blood, causing biliousness, &c., appear to be wholly imaginary. In a medical point of view it has been regarded as diuretic, sedative, and a corrector of opium. It should be given as medicine in a strong infusion, and is best cold. In spasmodic asthma it has been particularly serviceable; and it has been recommended in gangrene of the extremities arising from hard drinking. (See CAFFEIN.)

Pur. The most common adulteration of ground coffee is chicory, which is added not only to cheapen the article, but to improve the flavor of damaged or inferior berries. This adulteration may be readily detected by shaking a spoonful of the suspected coffee with a wine-glassful of water, when, if it be pure, it will swim and scarcely color the liquid, but if chicory be present, it will sink to the bottom, and the water will be tinged of a deep red. *Roasted corn* is another common adulteration. This may be detected by the cold decoction striking a blue color with tincture of iodine.

COFFEE CREAM. *Prep.* Add a teacupful of very clear strong coffee to 1 pint each of clarified calf's feet jelly and good cream; sweeten with lump sugar, give it one boil up, and pour it into shapes or glasses, when nearly cool. The calf's feet jelly should be thick enough to render the whole lightly solid but not stiff.

COFFEE DROPS. *Prep.* Make an infusion with 1 oz. of coffee, clarify it, and moisten 1 lb. of sugar therewith, in the way directed for confectionary drops.

COFFEE, ESSENCE OF. A concentrated infusion of coffee prepared by percolation, to which

VI. Fish may be preserved in a living state for 14 days or longer without water, by stopping their mouths with crumb of bread steeped in brandy, pouring a little brandy into them, and then placing them in straw in a moderately cool situation. (Prechtl. Encycl. Techn.)

VII. Immersion of the *cleaned* fish in water holding in solution $\frac{1}{300}$ or $\frac{1}{1400}$ part of creosote, and then drying them.

VII. Fish may be preserved in a dry state, and perfectly fresh, by means of sugar alone. Fresh fish may be thus kept for some days, so as to be as good when boiled as if just caught. If dried and kept free from mouldiness, there seems no limit to their preservation; and they are much better in this way than when salted. The sugar gives no disagreeable taste. This process is particularly valuable in making what is called *kippered salmon;* and the fish preserved in this manner are far superior in quality and flavor to those which are salted or smoked. A few tablespoonfuls of brown sugar are sufficient for a salmon of five or six pounds weight; and if salt be desired, a teaspoonful may be added. Saltpetre may be used instead, in the same proportion, if it be wished to make the kipper hard. (See ANIMAL SUBSTANCES USED AS FOOD.)

FIXATEUR. *Syn.* BANDOLINE. *Prep.* Soak Iceland moss in cold water for an hour or two, drain and dissolve in boiling water.

Remarks. A solution of gum arabic in water is also commonly called by the same name. It is used by ladies to make their hair curl firmly, and remain in any required position. It is applied by moistening the fingers, and passing the hair through them. Beer has a similar effect.

FLANNEL. It has been shown by the experiments of Count Rumford that the conducting power of the different materials employed for clothing varies considerably. A thermometer, surrounded with cotton-wool, and heated by immersion in boiling water, took 1046 seconds to lose 135°, when plunged into a bath of melting ice; but, under the same circumstances, when sheeps' wool was employed, 1118 seconds elapsed before a like sinking of the thermometer took place, (Phil. Trans. 1792;) thus showing the greater conducting power of the former, and consequently the superiority of the latter substance for the manufacture of warm clothing. But the chief advantage of wool as an article for under-clothing depends less upon its actual power of conducting heat than its peculiar texture. Flannel acts as a gentle stimulus on the skin, and exercises the most beneficial action, by keeping the pores clean, and in a state most favorable to perspiration. It has also the advantage of absorbing the perspiration as soon as emitted, and allowing its watery portion to pass off into the atmosphere almost as soon as formed, but this is not the case with cotton and linen fabrics. The different effects of flannel and linen are particularly perceptible during brisk exercise. When the body is covered with the former, though perspiration be necessarily increased, the perspired matter freely passes off through the flannel, and the skin remains dry and warm. If the same exercise be taken in linen shirts, perspiration, as in the former case, is indeed also increased, but the perspired matter, instead of being dispersed into the atmosphere, remains upon the linen, and not only clogs the pores of the skin, but gives a disagreeable sensation. From this property of flannel, persons who wear it next the skin seldom catch cold from changes of temperature, even though perspiring profusely; but in similar cases, when linen or calico shirts are worn, chilliness immediately comes on, followed by "*sniffling, sneezing*, and *cough*," and all the other symptoms of severe catarrh.

The common objections raised against the use of flannel are founded on vulgar prejudices, arising from ignorance, obstinacy, or bravado, and are undeserving of the notice of sensible people. In a fickle and moist climate like that of England, every person should wear a robe of flannel next the skin, or at all events a waistcoat of flannel reaching below the loins; and this should not be discarded as soon as the cold weather has passed, but its use should be continued all the year round; for in reality, flannel is, if possible, even more required in summer than in winter, because persons perspire more freely in hot than in cold weather, and are consequently more susceptible of cold, while at that period of the year their clothing is less capable of protecting them from the effects of sudden changes of temperature, and draughts of cold air, moisture, &c. Females, children, persons of delicate constitutions, and all others, who, from their habits of body or life, perspire freely, or are much exposed, should wear flannel.

In washing flannels, it is said they should be always put into scalding hot water, by which method their color will be preserved, and they will be prevented from shrinking.

FLASH. *Prep.* Burnt-sugar coloring 1 gall. fluid extract of capsicum, or essence of cayenne ½ pint, or enough to give a strong fiery taste.

Use. It is employed to color spirits, and to give them a false strength. It is made by the brewers' druggists, and vended under the name of "*isinglass and burnt sugar.*"

FLATULENCY. (From *flatus*, a blast.) A morbid collection of gas in the stomach and bowels. The most common cause of flatulency is indigestion. When the natural fluids of the stomach are secreted in a healthy state, they exercise an antiseptic and digestive action on the food, by which it is speedily reduced to a magma that is little liable to spontaneous change while in the body; but when the reverse is the case, fermentation rapidly commences, and the stomach and associated viscera become distended with gas, giving rise to frequent eructation and crepitation. The quantity of gas thus accumulated is often enormous. It is asserted that an ordinary apple during fermentation yields about 600 times its bulk of gas, and many vegetables much more. (Dr. Hales.) It is therefore, not at all surprising that so much inconvenience should be felt from flatulency.

Treat. The treatment of flatulency consists mainly in the selection of proper articles of food. Oleraceous vegetables, peas, beans, and indigestible fruits, should be especially avoided, as well as the use of large quantities of washy liquids. The diet should consist principally of animal food, well cooked, with a sufficient quantity of good potatoes and wheaten bread, moderately seasoned with spice, and the most suitable beverages are toast and w

a very low temperature, (in vacuo if possible,) until the mixture acquires the consistence of a syrup, paste, or candy. (The latter may be powdered.)

COFFEE, SUBSTITUTES FOR. These are numerous, but the principal are the following:

I. (*Rye coffee. Dillenius's ditto. Hunt's breakfast-powder.*) Rye, roasted along with a little butter, and ground to powder. A good substitute.

II. (*German coffee. Succory ditto. Chicory ditto.*) From succory, as above. *Used* either for or mixed with foreign coffee. The most common adulteration of the latter.

III. (*Rice coffee.*) From rice, as above. A good substitute.

IV. (*Currant coffee.*) From the seeds washed out of the cake left in making currant wine.

V. (*Gooseberry coffee.*) From gooseberry seeds, as the last.

VI. (*Holly coffee.*) From the berries.

VII. (*Egyptian coffee.*) From chickpeas.

VIII. (*Rosetta coffee.*) From fenugreek seeds moistened with lemon juice.

IX. (*Corsican coffee.*) From the seeds of the knee-holly.

X. (*Sassafras coffee.*) From the fruit or nut of the sassafras tree, or from the wood cut into chips. Very wholesome. Much recommended in skin diseases, &c.

XI. (*Raspings.*) The raspings of the crust of loaves, procured at the baker's. Equal to rye coffee.

XII. (*Beech-mast coffee.*) From beech-mast or nuts. Very wholesome.

XIII. (*Acorn coffee.*) From acorns, deprived of their shells, husked, dried, and roasted. A good substitute.

XIV. (*Beet-root coffee.*) From the yellow beet-root, sliced, dried in a kiln or oven, and ground with a little foreign coffee. A good substitute.

XV. (*Bean coffee.*) Horse-beans roasted along with a little honey or sugar. When removed from the fire, a small quantity of cassia-buds is frequently added, and the whole is stirred until cold. Said to be a good substitute.

XVI. (*Almond coffee.*) Rye or wheat roasted along with a few almonds. A very small quantity of cassia-buds improves it. A good substitute.

COINS, IMPRESSIONS FROM. A very easy and elegant way of taking the impressions of medals and coins, not generally known, is as follows: Melt a little isinglass glue with brandy, and pour it thinly over the medal, so as to cover its whole surface; let it remain on for a day or two, till it has thoroughly dried and hardened, and then take it off, when it will be fine, clear, and as hard as a piece of Muscovy glass, and will have a very elegant impression of the coin. It will also resist the effects of damp air, which occasions all other kinds of glue to soften and bend if not prepared in this way. (Shaw.) If the wrong side of the isinglass be breathed on, and gold-leaf applied, it will adhere, and be seen on the other side, producing a very pleasing effect. Isinglass glue, made with water alone, will do *nearly* as well as if brandy be used.

Remarks. Medals may also be copied by surrounding them with a hoop of paper, and pouring on them plaster of Paris (mixed with water to the consistence of cream) to the depth of about ½ an inch. Melted wax, stearine, fusible metal, or any similar material, may be used in the same way. If it be desired to copy the metal in copper, a mould should be first formed in the above manner, and the metal deposited on its surface by the agency of electricity. (See ELECTROTYPE.)

COLCHICINE. *Syn.* COLCHICINA. COLCHIA. A peculiar principle discovered by Gieger and Hesse in the seeds of the colchicum autumnale, or common meadow saffron. It also exists in the cormi or bulbs.

Prep. Macerate the crushed seeds in boiling alcohol, add hydrate of magnesia to throw down the alkaloid, digest the precipitate in boiling alcohol, and filter. By cautious evaporation colchicine will be deposited. It may be purified by re-solution.

Prop., &c. Odorless; tastes bitter; forms salts with the acids. It is very poisonous. One-tenth of a grain, dissolved in spirit, killed a cat in 12 hours. It differs from veratrine in being soluble in water, crystalline, and the non-production of sneezing when applied to the nose. Strong oil of vitriol turns this alkaloid of a yellowish brown; nitric acid of a deep violet, passing into indigo blue, green, and yellow.

COLCHICUM, POWDER OF. I. (*Collier.*) Seeds of colchicum 2 grs.; rhubarb 6 grs.; magnesia 10 grs.; mix for 1 powder, to be taken every six hours in acute rheumatism, inflammatory gout, &c., washing it down with a glass of Seltzer water, during high febrile action only.

II. (*Collier.*) Seeds of colchicum 3 grs.; muriate of ammonia 5 grs.; for 1 powder. For checking a paroxysm of gout, but its use requires caution. "After all that has been said respecting colchicum in gout, and admitting that it rarely fails to allay pain and check a paroxysm, I would record my opinion that he who would wish to arrive at a good old age, should eschew it as an ordinary remedy, and consider that he is drawing on his constitution for a temporary relief, with a certainty of becoming prematurely bankrupt in his vital energies."

COINDET'S PILLS. *Prep.* Protiodide of mercury 1 gr.; extract of liquorice 20 grs.; mix, and divide into 8 pills. *Dose.* 2 to 4 twice or thrice daily, as an alterative in scrofulous tumors, ulcers, &c.

COLD. When the body of an animal is immersed in an atmosphere at a temperature below the healthy standard, a sensation of coldness is experienced, produced by the passage of the caloric or heat of the body into the colder medium. If this withdrawal of caloric exceed the quantity produced by the vital system, the temperature of the body decreases, until it sinks below the point at which the functions of life can be performed. This declination is gradual; the extreme sensation of coldness changes into a disinclination for voluntary motion; next comes on drowsiness, followed by numbness and insensibility. In this state, if the sufferer be not rescued, and remedial measures had recourse to, death must rapidly follow.

Prevention of the effects of excessive cold.—The extremities of the body first suffer from the action of cold, owing to the circulation of the blood being less vigorous in those parts; they should,

d. Evaporate or distil off the spirit from the solution and washings as above; the residuum is sugar.

e. Dry the substances educed by the preceding operations by a *gentle* heat, and weigh them. The weight of the albumen may be taken with that of the gluten, as it possesses about the same nutritive value, and also because it has been asserted by some persons that the former substance is in reality gluten, and not albumen. By dividing the given weights by 10, the per centage value of the sample will be obtained. The pieces of filtering paper employed should be dried and weighed before using them; and the same degree of heat should be employed for this purpose, as that to which they will be afterwards exposed in the drying of the substances resulting from the operation.

Remarks. This method of ascertaining the actual value of any sample of flour as an article of food, though not strictly accurate, approximates sufficiently to the truth for all practical purposes, and is well adapted to the wants of the baker and large purchaser. In many cases it will only be necessary to perform the first part of the process, *a*, which will give the amount of the most important constituent of the flour; the rest being of minor consequence.

According to Vauquelin, French wheat flour contains about 10% of water, 11% of gluten, 71% of starch, 5% of sugar, and 3% of gum; and the water of the dough amounts to 50·3%.

FLOUR, BAKED. *Syn.* Farina tosta. F. Tritici Tosta. Astringent; used to make food for infants troubled with diarrhœa.

FLOWERS. *Syn.* Flores, (*Lat.*) Fleurs, (*Fr.*) Blumen, (*Ger.*) These beautiful and fragrant ornaments of our gardens, our sitting-rooms, and our chambers, are too well known to require description; but some remarks on their preservation, &c., may not be out of place here.

Flowers may be preserved in a fresh state for a considerable time, by keeping them in a moist atmosphere. When growing on the parent stem, the large amount of evaporation from the surface of their leaves, is compensated for by an equivalent proportion of moisture supplied by the roots; but when they are plucked, the evaporation from the surface continues, while the supply of moisture is cut off. Hence they fade, and that with a degree of rapidity exactly proportionate to the dryness of the air that surrounds them. It is on this account that recently-plucked flowers fade more rapidly indoors than in the open garden; for the air of a sitting-room is considerably *drier* and *warmer* than the external atmosphere. This is perfectly natural; for with diminished sources of nourishment, they are exposed to an augmented perspiration, and the water which forms the larger portion of their bodies is lost. In fact, they fade from the volatilization of one of their component parts, which is an essential constituent of every *living* flower. The flowers of plants also feed on the viewless oxygen of the air, and form carbonic acid with great rapidity. Thus those of the *passiflora serratifolia* consume of oxygen in this way 18½ times their bulk in 24 hours, when sheltered from the direct rays of the sun, at a temperature between 18° and 25° C.; the male flowers of the cucumber, 12 times their bulk; the female only 3½; the single red gilliflower (*cheiranthus incanus*) 11; the single tuberose 9; and the *typha latifolia* 9·8. (T. de Saussure, Ann. de Chim. xxi. 279.) To supply in part the loss of moisture by evaporation, has arisen the universal practice of placing them in water; but the mutilated stems possess a far inferior power of sucking up fluids to that of the roots, and though their decay may thus be slightly impeded, yet, as the balance of *gain* on the one hand by the roots, and *loss* on the other hand by evaporation from their whole surface, cannot be maintained, they fade as a natural consequence. To preserve them, or at least to render their existence less ephemeral, we have therefore only to restore this balance—to surround them with a medium that will rob them of no water; or, in other words, to place them in a moist atmosphere. "It is now eighteen years ago since we first saw, in the drawing-room of a gentleman, in the hot dry weather of the dog-days, flowers preserved day after day in all their freshness by the following simple contrivance:—A flat dish of porcelain had water poured into it. In the water a vase of flowers was set; over the whole a bell-glass was placed with its rim in the water. This was a 'Ward's case' in principle, although different in its construction. The air that surrounded the flowers being confined beneath the bell-glass, was constantly moist with the water that rose into it in the form of vapor. As fast as the water was condensed, it ran down the sides of the bell-glass back into the dish; and if means had been taken to enclose the water on the outside of the bell-glass, so as to prevent its evaporating into the air of the sitting-room, the atmosphere around the flowers would have remained continually damp. The only difference between plants in a 'Ward's case' and flowers in the little apparatus just described is this—that the former is intended for plants to grow in for a considerable space of time, while the latter is merely for their preservation for a few days; and that the air which surrounds the flowers is always charged with the same quantity of vapor, and will not vary with the circumstances, and at the will of him who has the management of it. We recommend those who love to see plenty of fresh flowers in their sitting-rooms in dry weather, to procure it. The experiment can be tried by inverting a tumbler over a rose-bud in a saucer of water." (Gardener's Chronicle.)

Faded flowers may be generally restored by immersing them half-way up their stems in very *hot* water, and allowing them to remain in it until it cools, or they have recovered. They must then be removed, the '*coddled*' portion of the stems cut off, and placed in clean cold water. In this way a great number of faded flowers may be restored, but there are some of the more fugacious kinds on which it proves useless.

To hasten the blowing of flowers the following liquid has been used with great advantage:—Sulphate or nitrate of ammonia 4 oz.; nitrate of potash 2 oz.; sugar 1 oz.; hot water 1 pint; dissolve and keep it in a well-corked bottle. *For use*, put 8 or 10 drops of this liquid into the water of a hyacinth-glass or jar for bulbous-rooted plants, changing the water every 10 or 12 days. For flowering plants in *pots* a few drops must be added to the water employed to moisten them. The preference

water the latter is removed. It may be purified by solution in alcohol, and evaporation.

Prop. A yellowish brown translucent resinous substance, very soluble in alcohol, less so in ether, and only slightly so in water. It is intensely bitter, and acts as a drastic purgative.

COLORING. *Syn.* BREWER'S COLORING, BRANDY DO. SPIRIT DO. ESSENTIA BINA. CARAMEL. *Prep.* Melt brown sugar in an iron vessel over the fire, until it grows black and bitter, stirring it well all the time, then make it into a sirup with water.

Remarks. Some use lime-water to dissolve the burnt sugar. Care must be taken not to overburn it, as a greater quantity is thereby rendered insoluble. The heat should not exceed 430°, nor be less than 400°. The process for nice experiments is best conducted in a bath of melted tin, to which a little bismuth has been added to reduce its melting point to about 435°; a little powdered resin or charcoal, or a little oil being put upon the surface of the metal to prevent oxidizement.

COLORS, COMPOUND. (IN DYEING.) The mixture of BLUE and YELLOW dyes produces *green;* RED and BLUE, *violet, purple, lilacs, &c.;* RED and YELLOW, *orange, cinnamon, &c.;* RED, YELLOW, and BLUE, *olives;* RED and BLUES, or GREEN or BLACK, *browns* of all shades; BLACK mixed with other dyes produces various shades of *brown* and *olive*, and when pale it constitutes *gray*, either by itself or the addition of a faint blue.

COLOMBIUM. A rare metal, discovered by Mr. Hatchet in 1801, in a black mineral belonging to the British Museum. Supposed to have been brought from America, hence the name. (See TANTALUM.)

COLUMBIC ACID. The preceding metal exists in its ores in the form of an acid, united to iron, manganese, or yttria. From these it may be obtained by fusion with 3 or 4 parts of potash, solution in water, and precipitation with an acid. It falls as a white powder or hydrate.

CONCENTRATION. (IN CHEMISTRY.) The volatilization of part of a liquid in order to increase the strength of the remainder. The operation can only be performed on solutions of substances of greater fixity than the menstrua in which they are dissolved. Many of the liquid acids, solutions of the alkalis, &c., are concentrated by distilling *off* their water.

(IN PHARMACY.) The term "concentrated" is very commonly applied to any liquid preparation possessing more than the usual strength. Thus we have "*concentrated*" *infusions, decoctions, liquors, solutions, tinctures,* and *essences,* most of which are made of 8 times the common strength. This is generally effected by using 8 times the usual quantity of the ingredients, with a given portion of the menstruum, and operating by digestion or percolation; the latter being generally adopted when the articles are bulky. When the menstruum is water, a little spirit is added to make the product keep.

CONCRETE. (IN ARCHITECTURE.) A compact mass, composed of pebbles, lime, and sand, employed in the foundations of buildings. The best proportions are 60 parts of coarse pebbles, 25 of rough sand, and 15 of lime.

CONDIMENTS. Substances taken with the food, to improve its flavor, or to render it more wholesome or digestible. The principal condiments are common salt, vinegar, lemon juice, spices, aromatic herbs, oil, butter, sugar, honey, and sauces. Most of these, in moderation, promote the appetite and digestion, but their excessive use tends to injure the stomach, and vitiate the gastric juice.

CONFECTIONS. (IN PHARMACY.) Medicines, usually pulverulent, mixed up to the consistence of a paste with powdered sugar, sirup, or honey. In the "London Pharmacopœia," both conserves and electuaries are included under this head, though there appears to be some little distinction between them. As remedial agents, the officinal confections possess but little value, and are chiefly useful as vehicles for the administration of more active medicines. In making confections, the sugar requires the same attention as for sirups. They should be kept in stone jars, covered with writing paper, and placed in a cool and dry situation. Without this precaution, they are apt to mould on the top. All the dry ingredients employed in making confections should be reduced to a very fine powder, and passed through a sieve not coarser than 80 holes to the inch.

CONFECTION OF ALMONDS. *Prep.* (*Confectio Amygdalæ*, P. L.) Sweet almonds ℥viii; white sugar ℥iv; powdered gum arabic ℥j. Macerate the almonds in *cold* water, then remove the skins, and beat them with the other ingredients until reduced to a smooth confection.

Use. To prepare milk of almonds. A little of this paste or powder, triturated with a sufficient portion of water, and strained through a piece of calico, forms emulsion of almonds.

CONFECTION OF ALKERMES. *Prep.* White sugar 1 lb.; rose-water ¼ pint; clarified juice of alkermes 3 lbs.; oil cinnamon 10 or 12 drops. Mix. It was formerly a common practice to add a little gold-leaf, rubbed small, so as to float about in it; also musk and ambergris.

CONFECTION OF ALUM. *Prep.* (*Conf. Aluminis*, St. B. H.) Alum in fine powder, 80 grs.; conserve of roses, enough to mix. *Use.* As an astringent.

CONFECTION, AROMATIC. *Syn.* SIR WALTER RALEIGH'S CORDIAL. CONFECTIO RALEIGHANA, (P. L. 1720.) DITTO CARDIACA, (P. L. 1745.) DITTO AROMATICA, (P. L. 1788, and since.) *Prep.* I. (P. L.) Nutmegs, cinnamon, and hay saffron, of each ℥ij; cloves ℥j; cardamoms ℥ss; prepared chalk ℥xvj; white sugar lbs. ij. Reduce the whole to a very fine powder, and keep it in a closed vessel. When wanted for use, mix it with water to the consistence of a confection.

Remarks. On the large scale the above form is seldom adhered to. Less saffron is commonly used, cassia is substituted for cinnamon, and, generally, the essential oil for the powder of cloves. Should there be any deficiency of color, this is brought up by a little tincture or infusion of turmeric. When a very smooth and fine powder is desired, it should be passed through a gauze sieve, not coarser than 80 holes to the inch, and precipitated chalk should be employed. The saffron should be dried with as little heat as possible, and care should be taken not to waste any in powdering. The following formula, which is employed by a large whole-

sale druggist in the city, produces an excellent article.

II. Hay saffron, cassia, and turmeric, of each 4 oz.; cardamoms 1 oz.; starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oil of nutmegs 2 drachms; oil of cloves 3 drachms. Reduce the dry ingredients to fine powder, and pass it through an 80 hole sieve, then add the oils, and after well mixing, pass it through a coarse sieve, (about 40 holes to the inch,) to ensure the whole being perfectly mixed.

The following form produces a powder possessing great depth and brilliancy of color.

III. Hay saffron 4 oz.; turmeric 3 oz.; powdered starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oils of cloves and cassia, of each 3 drachms; oil of nutmegs 2 drachms; essence of cardamoms 1 oz. *Proc.* Boil the saffron and turmeric in 1 gallon of water, placed in a bright copper pan, for 10 minutes, then, without straining, add the chalk, starch, and sugar; mix well, and continue stirring until the mixture becomes quite stiff, then break it up and dry it until fit for powdering. This must be performed in a water or steam bath. To the powder, passed through a fine sieve, as before, the oils and tincture must be added, and after being well mixed, and passed through a coarse sieve, it should be placed in a jar or bottle, and bunged up close.

Remarks. In the wholesale trade this article is kept under two forms: one in powder, as ordered by the College, and commonly called, for distinction sake, "*pulvis confectionis aromaticæ;*" the other mixed up ready for use. In preparing the latter, it is a common plan to make a strong infusion or decoction of the saffron, and to use it to mix up the other ingredients. Some persons follow the method described in the last formula, mixing up the powder to a proper consistence with water before adding the aromatics. When the price of *precipitated* chalk is an objection to its use, *prepared* chalk may be used instead. This confection is cordial, stimulant, and antacid. *Dose.* 10 to 60 grs.

CONFECTION OF BLACK PEPPER. *Syn.* Ward's Paste. *Prep.* (*Confectio Piperis Nigri*, P. L.) Black pepper and elecampane root, of each lb. j; fennel seed lb. iij; honey and white sugar, of each lb. ij; mix.

Remarks. The common practice is to keep the dry ingredients ready mixed in a bottle, and only to add the honey as wanted. The proportions are 2 parts of the latter to 7 of the mixture. The *dose* is 1 to 2 drachms 2 or 3 times a-day, in piles, fistula, &c. It should be persevered in for 2, 3, or 4 months, (Sir B. Brodie;) and as it is apt to accumulate in the bowels, its use should be accompanied by mild aperients. (Pereira.)

CONFECTIONS OF CASSIA. *Syn.* Electuarium Cassiæ, (P. L. 1788.) *Prep.* (*Confectio Cassiæ*, P. L.) Fresh cassia pulp lb. ss.; manna ℥ij; tamarind pulp ℥j; sirup of roses f℥viij. Bruise the manna and dissolve it in the sirup, then add the pulps and evaporate to a proper consistence.

CONFECTION OF HEMLOCK. (Dr. Osborne.) *Prep.* Fresh leaves of hemlock and moist sugar equal parts; beat them to a confection in a mortar.

CONFECTION OF OPIUM. *Syn.* Philonium Romanum, (P. L. 1720.) Ditto Londinense, (P. L. 1745.) Confectio Opiata, (P. L. 1788.) Ditto Opii, (P. L. 1809, and since.) *Prep.* (P. L.) Powdered opium ʒvj; long pepper ℥j; ginger ℥ij; caraways ℥iij; tragacanth ʒij; all in fine powder; sirup f℥xvj. Mix.

Use and Dose. This confection is intended as a substitute for the *mithridate* and *theriaca* of the old Pharmacopœia. It is stimulant and narcotic, and is given in flatulent colic and diarrhœa unaccompanied by fever. The dose is from 15 to 50 grs.

CONFECTION OF ORANGE PEEL. *Syn.* Conserva flavedinis Corticum Aurantiorum, (P. L. 1720 and 1745.) Ditto Corticis exterioris Aurantii Hispalensis, (P. L. 1788.) Ditto Aurantiorum, (P. L. 1824.) Ditto Aurantii, (P. L. 1809 and 1836.) *Prep.* (P. L.) The external rind of the fresh orange, separated by rasping, lb. j; white sugar lb. iij. Beat the rind in a stone mortar with a wooden pestle, then add the powdered sugar, and beat the mixture until the two are perfectly incorporated.

Remarks. This confection is tonic and stomachic, and is principally used as a vehicle for the exhibition of tonic powders.

CONFECTION OF PEPPERMINT. *Prep.* Green peppermint 4 oz.; powdered white sugar 12 oz.; beat them together as last.

Use. Anti-emetic and flatulent. Given in colic, &c., in the form of a bolus, or made into a mixture.

CONFECTION OF THE DOG ROSE. *Syn.* Confection of Hips. Conserva Fructus Cynosbati, (P. L. 1720 and 1745.) Ditto Cynosbati, (P. L. 1788.) Ditto Rosæ Caninæ, (P. L. 1809, and since.) *Prep.* (P. L.) Pulp of the dog rose lb. j; powdered refined sugar ℥xx; mix by a gentle heat in an earthen vessel.

II. Pulped hips 2 cwt.; fine white sugar 2½ cwt.; incorporate them without applying heat.

Remarks. Both this and the following confection has a brighter color, if made without heat, or touching metallic vessels. On the small scale it is made by beating the ingredients together in a marble mortar, but in large quantities by grinding in a mill. It is slightly laxative, and is principally used for forming pills. It candies by keeping.

CONFECTION OF THE RED ROSE. *Syn.* Conserva Rosarum Rubrarum, (P. L. 1745.) Ditto Rosæ, (P. L. 1788.) Ditto Rosæ Gallicæ, (P. L. 1809 and 1824.) Confectio Rosæ Gallicæ, (P. L. 1836.) *Prep.* (P. L.) Petals of the red rose lb. j; refined sugar lb. iij; beat the petals in a stone mortar, then add the sugar, and again beat until thoroughly incorporated.

Remarks. On the large scale this is prepared like the confection of hips. It is astringent and tonic, and principally used for forming pills. If taken alone, the dose is 1 to 2 drachms.

CONFECTION OF RUE. *Syn.* Electuarium e Boccis Lauri, (P. L. 1720, 1745.) Confectio Rutæ, (P. L. 1809, and since.) *Prep.* (P. L.) Dried rue, caraway, and laurel berries, of each ℥iss; sagapenum (true) ℥ss; black pepper ʒij; honey ℥xvj. Reduce the dry ingredients to very fine powder, and when wanted for use, make them into a confection with the honey.

Use, &c. It is antispasmodic; in enemas 30 to

60 grs., with half a pint of gruel, for flatulent colic, &c.

CONFECTION OF SCAMMONY. *Syn.* ELECTUARIUM CARYOCOSTINUM, (P. L. 1720.) DITTO E SCAMMONIO, (P L. 1745.) DITTO SCAMMONII, (P. L. 1809 and 1788.) CONFECTIO SCAMMONEÆ, (P. L. 1809 and 1824.) *Prep.* (*Confectio Scammonii* P. L.) Scammony ℥iss; cloves and ginger, of each, ʒvj; oil of caraway f3ss. Reduce the ingredients to a very fine powder, and when wanted for use, make them into a confection with sirup of roses, and lastly add the oil.

Use, &c. Cathartic in doses of 10 to 30 grs.

CONFECTION OF SENNA. *Syn.* LENITIVE ELECTUARY. ELECTUARIUM SENNÆ, (P. L. 1788.) CONFECTIO SENNA, (P. L. 1809, and since.) *Prep.* (P. L.) Senna ℥viij; figs lb. j; pulp of tamarinds, prunes, and cassia, of each, lb. ss.; coriander seeds ℥iv; liquorice ℥iij; sugar lb. iiss; water 3 pints. *Proc.* Rub the senna and coriander in a mortar, and separate by sifting ℥x of the mixed powders. Boil the figs and liquorice in the water, until reduced to one half; then press and strain the liquor. Evaporate the strained liquor until only 24 fluid ounces remain, then add the sugar, and when dissolved, mix in the pulps, and lastly the powder.

Use, Dose, &c. Confection of senna is a gentle and pleasant purgative, and well adapted for persons suffering from piles, and as a laxative during pregnancy. The dose is ¼ to ½ oz. taken at bedtime or early in the morning.

Remarks. Perhaps there is no one pharmacopœial preparation which it is more difficult to obtain of good quality than the above. The absolute cost of an article prepared according to the directions of the College, will be somewhere about 1*s.* 9*d.* per lb.; but there are many wholesale drug houses vending confection of senna, which they warrant as genuine, at from 9*d.* to 1*s.* a pound. Dr. Paris (in his Pharmacologia) very truly remarks, that "the directions of the Pharmacopœia are very rarely followed." I understand that considerable quantities are manufactured, into which unsound and spoiled apples enter as a principal ingredient. The following forms are, to my knowledge, employed by some members of the trade.

II. Powdered senna, pulp of tamarinds, cassia, and prunes, of each, 1½ lb.; powdered corianders ¼ lb.; Spanish juice ½ lb.; simple sirup 12 lbs.

III. As the above, omitting the cassia pulp, and adding 2 lbs. more tamarind pulp.

Both these articles are labelled P. L., and sent out as genuine, and that when no competition as to price exists. The cheaper article is made as follows:

IV. Common prunes and tamarinds, of each, 16 lbs.; treacle ¾ cwt.; species (a compound of senna dust and small senna, mixed with 3 lbs. of coriander seeds, and strengthened with jalap, all ground to a fine powder) 18¼ lbs. To this is frequently added ¼ cwt. of rotten or inferior apples, which are pulped with the prunes and tamarinds. This article is not unfrequently labelled "CONF. SENNÆ VER." by the conscientious tradesman.

CONFECTION OF SULPHUR, (COMPOUND.) *Prep.* (St. B. H.) Precipitated sulphur ℥ss; cream of tartar ʒj; honey ℥j; mix As a laxative in piles, &c. *Dose.* ℥ss.

CONFECTION OF STEEL. *Syn.* CONFECTION OF CARBONATE OF IRON. *Prep.* Confection of orange-peel and sesquioxide of iron, (P. L.,) of each, 4 oz.; powdered white sugar 6 oz.; simple sirup 2 oz.; mix. Aromatic and tonic. *Dose.* A teaspoonful to ½ oz. twice or thrice daily.

CONGELATION, (from *congelo,* to freeze.) IN CHEMISTRY. The conversion of a liquid into a solid state, by the action of cold.

The production of an extreme degree of cold is often of the utmost importance in chemical operations, and an easy method of doing so is consequently a desideratum. The means hitherto adopted for this purpose have either depended upon the sudden liquefaction of solids, or the abstraction of heat by rapid evaporation. The loss of sensible heat, by the first method, is the basis of the various processes of producing cold by what are commonly called freezing mixtures, all of which act upon the principle of liquefying solid substances without supplying heat. The caloric of liquidity being in these cases derived from that previously existing in the solid itself in a sensible state, the temperature must necessarily fall. The degree of cold produced, depends upon the quantity of heat which is thus diffused through a larger mass, or which, as it were, disappears, and this is dependent on the quantity of solid matter liquefied, and the rapidity of the liquefaction. Saline compounds are the substances most frequently employed, and those which have the greatest affinity for water, and thus liquefy the most rapidly, produce the greatest degree of cold. Thus it is, that chloride of calcium and nitrate of ammonia, when dry and in fine powder, if suddenly mixed with water, produce extreme cold. The latter, suddenly mixed with an equal weight of water at 50°, will sink the thermometer to +4°, or 28° below the freezing point. The most common and convenient freezing mixture, when snow can be procured, is formed by mixing 2 parts of that substance with 1 part of sea-salt. This will sink the thermometer to —5°, or 37° below the freezing point of water. Equal parts of these substances produce a degree of cold marked by the zero of Fahrenheit's thermometer, and is the standard taken for graduating that instrument. Mr. Walker, a gentleman who fully investigated this subject, recommends the following proportions for the production of extreme cold.

sale druggist in the city, produces an excellent article.

II. Hay saffron, cassia, and turmeric, of each 4 oz.; cardamoms 1 oz.; starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oil of nutmegs 2 drachms; oil of cloves 3 drachms. Reduce the dry ingredients to fine powder, and pass it through an 80 hole sieve, then add the oils, and after well mixing, pass it through a coarse sieve, (about 40 holes to the inch,) to ensure the whole being perfectly mixed.

The following form produces a powder possessing great depth and brilliancy of color.

III. Hay saffron 4 oz.; turmeric 3 oz.; powdered starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oils of cloves and cassia, of each 3 drachms; oil of nutmegs 2 drachms; essence of cardamoms 1 oz. *Proc.* Boil the saffron and turmeric in 1 gallon of water, placed in a bright copper pan, for 10 minutes, then, without straining, add the chalk, starch, and sugar; mix well, and continue stirring until the mixture becomes quite stiff, then break it up and dry it until fit for powdering. This must be performed in a water or steam bath. To the powder, passed through a fine sieve, as before, the oils and tincture must be added, and after being well mixed, and passed through a coarse sieve, it should be placed in a jar or bottle, and bunged up close.

Remarks. In the wholesale trade this article is kept under two forms: one in powder, as ordered by the College, and commonly called, for distinction sake, "*pulvis confectionis aromaticæ;*" the other mixed up ready for use. In preparing the latter, it is a common plan to make a strong infusion or decoction of the saffron, and to use it to mix up the other ingredients. Some persons follow the method described in the last formula, mixing up the powder to a proper consistence with water before adding the aromatics. When the price of *precipitated* chalk is an objection to its use, *prepared* chalk may be used instead. This confection is cordial, stimulant, and antacid. *Dose.* 10 to 60 grs.

CONFECTION OF BLACK PEPPER. *Syn.* WARD'S PASTE. *Prep.* (*Confectio Piperis Nigri*, P. L.) Black pepper and elecampane root, of each lb. j; fennel seed lb. iij; honey and white sugar, of each lb. ij; mix.

Remarks. The common practice is to keep the dry ingredients ready mixed in a bottle, and only to add the honey as wanted. The proportions are 2 parts of the latter to 7 of the mixture. The *dose* is 1 to 2 drachms 2 or 3 times a-day, in piles, fistula, &c. It should be persevered in for 2, 3, or 4 months, (Sir B. Brodie;) and as it is apt to accumulate in the bowels, its use should be accompanied by mild aperients. (Pereira.)

CONFECTIONS OF CASSIA. *Syn.* ELECTUARIUM CASSIÆ, (P. L. 1788.) *Prep.* (*Confectio Cassiæ*, P. L.) Fresh cassia pulp lb. ss.; manna ℥ij; tamarind pulp ℥j; sirup of roses f℥viij. Bruise the manna and dissolve it in the sirup, then add the pulps and evaporate to a proper consistence.

CONFECTION OF HEMLOCK. (Dr. Osborne.) *Prep.* Fresh leaves of hemlock and moist sugar equal parts; beat them to a confection in a mortar.

CONFECTION OF OPIUM. *Syn.* PHILONIUM ROMANUM, (P. L. 1720.) DITTO LONDINENSE, (P. L. 1745.) CONFECTIO OPIATA, (P. L. 1788.) DITTO OPII, (P. L. 1809, and since.) *Prep.* (P. L.) Powdered opium ʒvj; long pepper ℥j; ginger ℥ij; caraways ℥iij; tragacanth ʒij; all in fine powder; sirup f℥xvj. Mix.

Use and Dose. This confection is intended as a substitute for the *mithridate* and *theriaca* of the old Pharmacopœia. It is stimulant and narcotic, and is given in flatulent colic and diarrhœa unaccompanied by fever. The dose is from 15 to 50 grs.

CONFECTION OF ORANGE PEEL. *Syn.* CONSERVA FLAVEDINIS CORTICUM AURANTIORUM, (P. L. 1720 and 1745.) DITTO CORTICIS EXTERIORIS AURANTII HISPALENSIS, (P. L. 1788.) DITTO AURANTIORUM, (P. L. 1824.) DITTO AURANTII, (P. L. 1809 and 1836.) *Prep.* (P. L.) The external rind of the fresh orange, separated by rasping, lb. j; white sugar lb. iij. Beat the rind in a stone mortar with a wooden pestle, then add the powdered sugar, and beat the mixture until the two are perfectly incorporated.

Remarks. This confection is tonic and stomachic, and is principally used as a vehicle for the exhibition of tonic powders.

CONFECTION OF PEPPERMINT. *Prep.* Green peppermint 4 oz.; powdered white sugar 12 oz.; beat them together as last.

Use. Anti-emetic and flatulent. Given in colic, &c., in the form of a bolus, or made into a mixture.

CONFECTION OF THE DOG ROSE. *Syn.* CONFECTION OF HIPS. CONSERVA FRUCTUS CYNOSBATI, (P. L. 1720 and 1745.) DITTO CYNOSBATI, (P. L. 1788.) DITTO ROSÆ CANINÆ, (P. L. 1809, and since.) *Prep.* (P. L.) Pulp of the dog rose lb. j; powdered refined sugar ℥xx; mix by a gentle heat in an earthen vessel.

II. Pulped hips 2 cwt.; fine white sugar 2½ cwt.; incorporate them without applying heat.

Remarks. Both this and the following confection has a brighter color, if made without heat, or touching metallic vessels. On the small scale it is made by beating the ingredients together in a marble mortar, but in large quantities by grinding in a mill. It is slightly laxative, and is principally used for forming pills. It candies by keeping.

CONFECTION OF THE RED ROSE. *Syn.* CONSERVA ROSARUM RUBRARUM, (P. L. 1745.) DITTO ROSÆ, (P. L. 1788.) DITTO ROSÆ GALLICÆ, (P. L. 1809 and 1824.) CONFECTIO ROSÆ GALLICÆ, (P. L. 1836.) *Prep.* (P. L.) Petals of the red rose lb. j; refined sugar lb. iij; beat the petals in a stone mortar, then add the sugar, and again beat until thoroughly incorporated.

Remarks. On the large scale this is prepared like the confection of hips. It is astringent and tonic, and principally used for forming pills. If taken alone, the dose is 1 to 2 drachms.

CONFECTION OF RUE. *Syn.* ELECTUARIUM E BOCCIS LAURI, (P. L. 1720, 1745.) CONFECTIO RUTÆ, (P. L. 1809, and since.) *Prep.* (P. L.) Dried rue, caraway, and laurel berries, of each ℥iss; sagapenum (true) ℥ss; black pepper ʒij; honey ℥xvj. Reduce the dry ingredients to very fine powder, and when wanted for use, make them into a confection with the honey.

Use, &c. It is antispasmodic; in enemas 30 to

60 grs., with half a pint of gruel, for flatulent colic, &c.

CONFECTION OF SCAMMONY. *Syn.* ELECTUARIUM CARYOCOSTINUM, (P. L. 1720.) DITTO E SCAMMONIO, (P L. 1745.) DITTO SCAMMONII, (P. L. 1809 and 1788.) CONFECTIO SCAMMONEÆ, (P. L. 1809 and 1824.) *Prep.* (*Confectio Scammonii* P. L.) Scammony ℥iss; cloves and ginger, of each, ʒvj; oil of caraway fʒss. Reduce the ingredients to a very fine powder, and when wanted for use, make them into a confection with sirup of roses, and lastly add the oil.

Use, &c. Cathartic in doses of 10 to 30 grs.

CONFECTION OF SENNA. *Syn.* LENITIVE ELECTUARY. ELECTUARIUM SENNÆ, (P. L. 1788.) CONFECTIO SENNA, (P. L. 1809, and since.) *Prep.* (P. L.) Senna ℥viij; figs lb. j; pulp of tamarinds, prunes, and cassia, of each, lb. ss.; coriander seeds ℥iv; liquorice ℥iij; sugar lb. iiss; water 3 pints. *Proc.* Rub the senna and corianders in a mortar, and separate by sifting ℥x of the mixed powders. Boil the figs and liquorice in the water, until reduced to one half; then press and strain the liquor. Evaporate the strained liquor until only 24 fluid ounces remain, then add the sugar, and when dissolved, mix in the pulps, and lastly the powder.

Use, Dose, &c. Confection of senna is a gentle and pleasant purgative, and well adapted for persons suffering from piles, and as a laxative during pregnancy. The dose is ¼ to ½ oz. taken at bedtime or early in the morning.

Remarks. Perhaps there is no one pharmacopœial preparation which it is more difficult to obtain of good quality than the above. The absolute cost of an article prepared according to the directions of the College, will be somewhere about 1*s.* 9*d.* per lb.; but there are many wholesale drug houses vending confection of senna, which they warrant as genuine, at from 9*d.* to 1*s.* a pound. Dr. Paris (in his Pharmacologia) very truly remarks, that "the directions of the Pharmacopœia are very rarely followed." I understand that considerable quantities are manufactured, into which unsound and spoiled apples enter as a principal ingredient. The following forms are, to my knowledge, employed by some members of the trade.

II. Powdered senna, pulp of tamarinds, cassia, and prunes, of each, 1½ lb.; powdered corianders ¾ lb.; Spanish juice ½ lb.; simple sirup 12 lbs.

III. As the above, omitting the cassia pulp, and adding 2 lbs. more tamarind pulp.

Both these articles are labelled P. L., and sent out as genuine, and that when no competition as to price exists. The cheaper article is made as follows:

IV. Common prunes and tamarinds, of each, 16 lbs.; treacle ¾ cwt.; species (a compound of senna dust and small senna, mixed with 3 lbs. of coriander seeds, and strengthened with jalap, all ground to a fine powder) 18¾ lbs. To this is frequently added ¼ cwt. of rotten or inferior apples, which are pulped with the prunes and tamarinds. This article is not unfrequently labelled "CONF. SENNÆ VER." by the conscientious tradesman.

CONFECTION OF SULPHUR, (COMPOUND.) *Prep.* (St. B. H.) Precipitated sulphur ℥ss; cream of tartar ʒj; honey ℥j; mix As a laxative in piles, &c. *Dose.* ℥ss.

CONFECTION OF STEEL. *Syn.* CONFECTION OF CARBONATE OF IRON. *Prep.* Confection of orange-peel and sesquioxide of iron, (P. L.,) of each, 4 oz.; powdered white sugar 6 oz.; simple sirup 2 oz.; mix. Aromatic and tonic. *Dose.* A teaspoonful to ½ oz. twice or thrice daily.

CONGELATION, (from *congelo,* to freeze.) IN CHEMISTRY. The conversion of a liquid into a solid state, by the action of cold.

The production of an extreme degree of cold is often of the utmost importance in chemical operations, and an easy method of doing so is consequently a desideratum. The means hitherto adopted for this purpose have either depended upon the sudden liquefaction of solids, or the abstraction of heat by rapid evaporation. The loss of sensible heat, by the first method, is the basis of the various processes of producing cold by what are commonly called freezing mixtures, all of which act upon the principle of liquefying solid substances without supplying heat. The caloric of liquidity being in these cases derived from that previously existing in the solid itself in a sensible state, the temperature must necessarily fall. The degree of cold produced, depends upon the quantity of heat which is thus diffused through a larger mass, or which, as it were, disappears, and this is dependent on the quantity of solid matter liquefied, and the rapidity of the liquefaction. Saline compounds are the substances most frequently employed, and those which have the greatest affinity for water, and thus liquefy the most rapidly, produce the greatest degree of cold. Thus it is, that chloride of calcium and nitrate of ammonia, when dry and in fine powder, if suddenly mixed with water, produce extreme cold. The latter, suddenly mixed with an equal weight of water at 50°, will sink the thermometer to +4°, or 28° below the freezing point. The most common and convenient freezing mixture, when snow can be procured, is formed by mixing 2 parts of that substance with 1 part of sea-salt. This will sink the thermometer to —5°, or 37° below the freezing point of water. Equal parts of these substances produce a degree of cold marked by the zero of Fahrenheit's thermometer, and is the standard taken for graduating that instrument. Mr. Walker, a gentleman who fully investigated this subject, recommends the following proportions for the production of extreme cold.

TABLES *exhibiting a collective View of all the* FRIGORIFIC MIXTURES *contained in* MR. WALKER'S *Publication*, 1808.

TABLE I. Consisting of Frigorific Mixtures, composed of Ice, with Chemical Salts and Acids.

Mixtures		Thermometer sinks.	Degree of cold produced.
Snow or pounded ice Muriate of soda	2 parts 1 "	From any temperature to —5°	*
Snow or pounded ice Muriate of soda Muriate of ammonia	5 " 2 " 1 "	From any temperature to —12°	*
Snow or pounded ice Muriate of soda Muriate of ammonia Nitrate of potash	24 " 10 " 5 " 5 "	From any temperature to —18°	*
Snow or pounded ice Muriate of soda Nitrate of ammonia	12 " 5 " 5 "	From any temperature to —25°	*
Snow Diluted sulphuric acid†	3 " 2 "	From +32° to —23°	55°
Snow Muriatic acid (concentrated)	8 " 5 "	From +32° to —27°	59
Snow Concentrated nitrous acid	7 " 4 "	From +32° to —30°	62
Snow Muriate of lime	4 " 5 "	From +32° to —40°	72
Snow Crystallized muriate of lime	2 " 3 "	From +32° to —50°	82
Snow Potash	3 " 4 "	From +32° to —51°	83

N. B. The reason for the omissions in the last column of this table is, the thermometer sinking in these mixtures to the degree mentioned in the preceding column, and never lower, whatever may be the temperature of the materials at mixing.

TABLE II. Consisting of Frigorific Mixtures, having the power of generating or creating Cold, without the aid of Ice, sufficient for all useful and philosophical purposes, in any part of the world at any season.

Mixtures.		Thermometer sinks.	Degree of cold produced.
Muriate of ammonia Nitrate of potash Water	5 parts 5 " 16 "	From +50° to +10°	40°
Muriate of ammonia Nitrate of potash Sulphate of soda Water	5 " 5 " 8 " 16 "	From +50° to +4°	46
Nitrate of ammonia Water	1 " 1 "	From +50° to +4°	46
Nitrate of ammonia Carbonate of soda Water	1 " 1 " 1 "	From +50° to —7°	57
Sulphate of soda Diluted nitrous acid‡	3 " 2 "	From +50° to —3°	53
Sulphate of soda Muriate of ammonia Nitrate of potash Diluted nitrous acid	6 " 4 " 2 " 4 "	From +50° to —10°	60

† Strong acid 2 parts; water or snow 1 part, by weight.
‡ Fuming nitrous acid 2 parts; water 1 part, by weight.

Table II. continued.

Mixtures.	Thermometer sinks.	Degree of cold produced.
Sulphate of soda . . . . 6 parts Nitrate of ammonia. . . . 5 " Diluted nitrous acid . . . . 4 "	From +50° to —14°	64°
Phosphate of soda . . . . 9 " Diluted nitrous acid . . . . 4 "	From +50° to —12°	62
Phosphate of soda . . . . 9 " Nitrate of ammonia . . . . 6 " Diluted nitrous acid. . . . 4 "	From +50° to —21°	71
Sulphate of soda . . . . 8 " Muriatic acid . . . . 5 "	From +50° to 0°	50
Sulphate of soda . . . . 5 " Diluted sulphuric acid* . . . 4 "	From +50° to +3°	47

N. B. If the materials are mixed at a warmer temperature than that expressed in the Table, the effect will be proportionately greater; thus, if the most powerful of these mixtures be made when the air is +85°, it will sink the thermometer to +2°.

TABLE III. Consisting of Frigorific Mixtures selected from the foregoing Tables, and combined so as to increase or extend Cold to the extremest Degrees.

Mixtures.	Thermometer sinks.	Degree of cold produced.
Phosphate of soda . . . . 5 parts Nitrate of ammonia. . . . 3 " Diluted nitrous acid . . . . 4 "	From 0° to —34°	34°
Phosphate of soda . . . . 3 " Nitrate of ammonia . . . . 2 " Diluted mixed acids. . . . 4 "	From —34° to —50°	16
Snow . . . . 3 " Diluted nitrous acid. . . . 2 "	From 0° to —46°	46
Snow . . . . 8 " Diluted sulphuric acid . . . 3 " Diluted nitrous acid . . . . 3 "	From —10° to —56°	46
Snow . . . . 1 " Diluted sulphuric acid . . . . 1 "	From —20° to —60°	40
Snow . . . . 3 " Muriate of lime . . . . . 4 "	From +20° to —48°	68
Snow . . . . 3 " Muriate of lime . . 4 "	From +10° to —54°	64
Snow . . . . 2 " Muriate of lime . . . 3 "	From —15° to —68°	53
Snow . . . . 1 " Crystallized muriate of lime. . 2 "	From 0° to —66°	66
Snow . . . . 1 " Crystallized muriate of lime. . 2 "	From —40° to —73°	33
Snow . . . . 8 " Diluted sulphuric acid . . . 10 "	From —68° to —91°	23

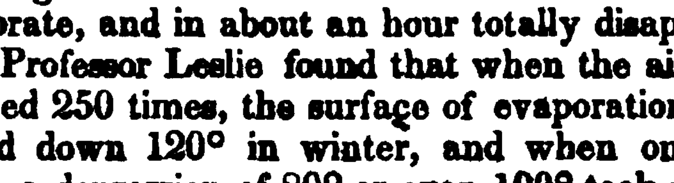
Remarks. The above artificial processes for the production of cold are more effective when the ingredients are first cooled by immersion in other freezing mixtures. In this way Mr. Walker succeeded in producing a cold equal to 100° below the zero of Fahrenheit, or 132° below the freezing point of water.

The materials in the first column are to be cooled, previously to mixing, to the temperature required, by mixtures taken from either of the preceding tables.

* Equal weights of strong acid and water.

II. (*By evaporation.*) When heat passes from the sensible to the insensible state, as in the formation of vapor, cold is generated. This may be illustrated by pouring a few drops of ether, or highly rectified alcohol, on the palm of the hand, when a strong sensation of cold will be produced. In like manner, if the bulb of a thermometer be covered with lint, and the latter moistened with ether, the quicksilver will rapidly fall. Even in hot climates water is frozen by the joint operation of evaporation and radiation. The natives of India procure ice when the temperature of the air much exceeds the freezing point. On the open plains, near Calcutta, this is effected by exposing a thin stratum of water to the atmosphere, during the fine clear nights of December, January, and February. The pans are made of porous earthenware, and water is poured in to the depth of about $1\frac{1}{2}$ inches. A large number of vessels of this kind are arranged in an excavation in the ground, 30 or 40 feet square and 2 feet deep, the bottom of which is covered, to the depth of 10 or 12 inches, with sugar canes or the stalks of Indian corn. At sunrise the pans are visited, the ice separated from the water, and packed as tight as possible in a deep cavity or pit, well screened from the heat.

It has been found that evaporation proceeds much more rapidly from the surface of fluids in a vacuum than in the atmosphere. Dr. Cullen was the first person to apply this practically. In 1755 he plunged a vial of ether into a tumbler of water, and on placing it under a receiver and exhausting the air, the ether boiled and the water was speedily frozen. In 1777, Mr. Nairne published his method of rendering the rarefied atmosphere of an exhausted receiver free from aqueous vapor by means of sulphuric acid. By the application of this discovery, Professor Leslie in 1810 succeeded in freezing water with great ease. This he effected by introducing a surface of sulphuric acid under the receiver of an air-pump, over which he placed a watch-glass filled with water, so that the vapor arising from the latter was rapidly absorbed by the former. After a few strokes of the piston the water was converted into a solid cake of ice, which on being left in the rarefied medium continued to evaporate, and in about an hour totally disappeared. Professor Leslie found that when the air was rarefied 250 times, the surface of evaporation was cooled down 120° in winter, and when only 50 times, a depression of 80° or even 100° took place. A pleasing philosophical toy, illustrative of the evaporative power of a vacuum, is the Cryophorus, or frost-bearer of Dr. Wollaston. This instrument consists of two small glass globes united by a tube, one of which is partly filled with water, but the apparatus is perfectly free from air.



The part of the apparatus unoccupied by the water, though apparently empty, is in reality filled with aqueous vapor, and thus checks evaporation by its pressure on the surface of the water. No sooner is the pressure removed, as by plunging the empty ball into a freezing mixture, (which condenses the vapor,) than rapid evaporation commences, and the water in the other ball is frozen in two or three minutes.

To succeed well in the production of cold in this way, it is necessary that the surfaces of the two fluids should be pretty near together, and that the acid should have the greater amount of surface of the two. The acid should be poured to the depth of $\frac{1}{2}$ an inch into a broad shallow dish or capsule, and the water into another vessel of a similar kind, but having only half the diameter of the former, and proportionally shallow. The smaller capsule may be supported over the surface of the larger one by means of 3 slender feet. As soon as the acid has acquired one-tenth of its weight of water, its absorbent power is diminished $\frac{1}{100}$; when this dilution reaches $\frac{1}{4}$ the reduction is $\frac{1}{25}$, and when it reaches $\frac{1}{2}$ the cooling power has diminished about 50%. "Sulphuric acid is capable of congealing more than 20 times its weight of water before it has imbibed nearly its own bulk of that liquid, or has lost about $\frac{1}{8}$ of its refrigerating power." (Ure.) Sulphuric acid, which has become diluted in this way, may be reconcentrated by heat.

It has been discovered that oatmeal, dried nearly to brownness before a common fire, and cooled in close vessels, may be substituted for sulphuric acid. With a quantity of this substance, one foot diameter, and 1 inch deep, Professor Leslie froze 1 imperial pint of water, contained in a hemispherical porous cup. Ignited chloride of calcium, in porous pieces, has also been successfully used for the same purpose. Dr. Ure has found that a requisite vacuum may be produced by the agency of steam, in the following manner, without the use of an air-pump: "A cast-iron drum of considerable dimensions being filled with steam by heating a small quantity of water in it, will sufficiently expel the air. When it is cooled by the affusion of water, a transferrer plate being attached to the stopcock on its upper surface would easily enable us, without any air-pump, to effect congelation by means of sulphuric acid in the attenuated atmosphere. Suppose the capacity of the receiver to be one-sixtieth of the iron cylinder, an aëriform rarefaction to this degree would be effected in a moment by a turn of the stopcock; and, on its being returned, the moisture below would be cut off, and the acid would speedily condense the small quantity of vapor which had ascended."

Many curious experiments may be performed over sulphuric acid, in the receiver of an air-pump, among which one of the most instructive and amusing is the congelation of quicksilver, a metal which requires, for this purpose, a temperature of 39° below zero, or 71° below the freezing point of water. This is readily effected by suspending the metal in a capsule of ice by means of threads, near to the surface of the sulphuric acid, and urging the rarefaction as much as possible. Mercury so frozen may be kept in the solid state for several hours.

The processes of congelation above detailed admit of being applied to several useful purposes, especially in domestic economy, and the arts of the cook and confectioner, as in the making of ices, &c.

CONGREVE MATCHES. I. (*Process of M. Jeblonouski.*) Put phosphorus 40 grammes into a wide-mouthed vial, with enough oil of turpentine to cover it, add flowers of sulphur 10 gr.,

and put the vial into hot water, (using great caution,) until the phosphorus is melted. Then cork close and agitate until cold, when any supernatant spirits of turpentine must be poured off. Into this pulpy mass the extremities of the matches are dipped, and when they have become *rather* dry, they are again dipped into the following mixture: Gum arabic 30 grammes, (dissolved in a little water;) chlorate of potassa 20 grammes; soot, or vermilion, (rubbed up with a few drops of alcohol,) 10 gr.; mix, and dip the tips of the matches therein as before, then dry them cautiously in a warm apartment. These matches inflame without fulmination (noise) on being rubbed against any rough surface.

II. (*Joblonouski.*) Chlorate of potassa 2 parts; phosphorus 4 parts; gum arabic 7 parts; gelatin 2 parts. *Proc.* The phosphorus is divided in the gum brought to the state of thick mucilage, and warmed; the gelatin is melted and added to the phosphoreted mucilage. The chlorate of potassa is bruised in a mortar, and at the same time moistened with the mucilage. When it is bruised the whole is mixed together, and a paste is obtained, with which matches, tipped with sulphur, may be embued. They are then dried in the air.

III. (*Process of Dr. R. Boettger.*) Gum arabic and vermilion, of each 16 parts; phosphorus 9 parts; saltpetre 14 parts. *Proc.* The phosphorus must be reduced to a state of fine division, by agitating it with fresh urine, or, still better, a solution of pure urea, which, in consequence of the discovery by Liebig, of a process of preparing that substance artificially, may now be easily procured or made. Hot water must be employed to melt the phosphorus, and this part of the process is similar to that previously detailed. The minutely divided phosphorus thus formed, is mixed with the other articles made into a paste, with the gum dissolved in the least quantity of water, and the matches dipped into the mingled ingredients and dried. They are then dipped into a dilute varnish of copal, or a thin solution of gum arabic containing saltpetre, and again dried. (Boettger's Beitrage.) These matches are very superior, and explode without noise.

Remarks. The matches formerly made, exploded with a crackling noise, and frequently threw out small sparks of fire, which rendered them dangerous. This arose from their containing too large a quantity of chlorate of potassa. An opposite plan is now generally followed, and a less proportion of the chlorate is used, or instead thereof saltpetre. The quantity of the igniting ingredients has also been greatly lessened, so as to avoid any danger on that account. This plan answers very well, when the body of the matches, whether of wood or pasteboard, is properly prepared; but if this be not the case, frequent disappointment will occur, from their going out again immediately after inflaming. To prevent this, the matches should be dipped into sulphur previously to coating them with the composition, unless intended for cigar fusees, when they should be prepared by soaking them in water holding some saltpetre, bichromate of potash, or acetate of lead in solution, preference being usually given to the first of these articles. Different coloring substances are employed to tint the composition, according to the fancy of the manufacturer, as smalts, red lead, vermilion, black oxide of manganese, soot, &c. A very elegant method of reducing phosphorus to a state of minute division, is to melt it in rectified spirit, and agitate until cold, as above.

The manufacture and sale of matches, containing sulphur and phosphorus, as in the first formula, have been forbidden in Paris, in consequence of the extreme facility with which they ignite, having led to several accidents. (See CHLORATE MATCHES, and LUCIFERS.)

CONIA. *Syn.* CONEINE. CONICIN. CICUTINE, &c. A poisonous alkaloid, discovered by Giesecke in hemlock.

Prep. Distil the seeds of hemlock, or their alcoholic extract, with water and potassa. During this process, the conia passes over into the receiver and floats upon the top of the water, which also contains a little conia in solution. It must be purified in the way directed for the volatile bases. (See ALKALOID.) If the alcoholic extract be employed, about ½ its weight of potassa should be used.

Remarks. 6 lbs. of fresh and 9 lbs. of dried seeds yielded 1 oz. of conia. (Gieger.) 40 lbs. of the ripe but green seeds yielded 2½ oz. of hydrated conia. (Christison.) It is remarkably poisonous. One drop, placed in the eye of a rabbit, killed it in 9 minutes. Five drops, poured into the throat of a dog, killed it in less than a minute. It has been employed in some convulsive and spasmodic diseases. "The plaintive cries, the contortions, and the rigidity of the limbs, which have always preceded death, (caused by conia,) leave no doubt as to the cruel pains which this kind of poisoning brings on." (Boutron-Chalard and Henry.)

CONSERVES. (From *conservo*, to keep.) In pharmacy, a composition of some recent vegetable matter and sugar, beat together to the consistence of a paste. The object aimed at in the preparation of conserves, is to preserve the properties of the active ingredient, which would otherwise be liable to change. In the last edition of the London Pharmacopœia, conserves, as well as electuaries, are included under the head of confections. The term confection appears, however, less appropriate to some of them, than the word conserve or electuary. The word confection has a more general application, and implies any sweetmeat or composition, in which sugar is the principal ingredient.

CONSERVE OF ALMONDS. (CONSERVA AMYGDALARUM, P. D.) Confection of almonds.

CONSERVE, ANTISCORBUTIC. (CONSERVA ANTISCORBUTICA. Selle.) Horseradish, water-cress, water-trefoil, radish juice, and orange juice, of each equal parts; white sugar enough to make a confection.

CONSERVE OF ARUM. (WAKEROBIN.) *Prep.* Fresh arum roots ½ lb.; white sugar 1½ lb.; beat together. Diuretic and attenuant.

CONSERVE OF LAVENDER. *Prep.* Lavender flowers 1 part; lump sugar 3 parts; beat together.

Remarks. In a similar way conserves are made from various other leaves and flowers; but mostly with only twice their weight of sugar. The above is frequently used to sweeten the breath.

CONSERVE OF LEMON-PEEL. *Prep* Rasp off the external rind of the lemon, and beat

it in a mortar with three times its weight of powdered white sugar. (See CONFECTION OF ORANGE-PEEL.) Tonic and stomachic.

CONSERVE OF ORANGE-PEEL. (CONSERVA AURANTII, P. E.) The same as the confection of orange-peel, P. L.

CONSERVE OF RED ROSES. (CONSERVA ROSÆ, P. E. and D.) That of the Dublin Pharmacopœia is the same as the confection of roses, P. L.; that of the Edinburgh has only 2 lbs. of sugar to 1 lb. of rose petals.

CONSERVE OF ROSEMARY. *Prep.* 1 part of the leaves or tops, beaten up with 3 parts of sugar.

CONSERVE OF SCURVY GRASS. *Syn.* CONSERVA COCHLEARIÆ HORTENSIS. *Prep.* Beat 1 lb. of the leaves with 3 lbs. of lump sugar. Stimulant and antiscorbutic.

CONSERVE OF SLOES. *Syn.* CONSERVA PRUNI SYLVESTRIS, (P. L. 1788.) Pulp of sloes 1 part; sugar 3 parts; mix.

CONSERVE OF SQUILLS. *Syn.* CONSERVA SCILLÆ, (P. L. 1788.) Fresh squills ℥j; white sugar ℥v; mix. Diuretic; attenuant.

CONSERVE OF TAMARINDS. *Syn.* CONSERVA TAMARINDORUM. *Prep.* (P. Cod.) Pulp of tamarinds 4 oz.; white sugar 6 oz.; heat by a water-bath in an earthen vessel, until mixed and of a due consistence.

CONSERVE OF WORMWOOD. *Syn.* CONSERVA ABSINTHII MARITIMI, (P. L. 1788.) *Prep.* Beat fresh-picked leaves of sea wormwood in a marble mortar, with a wooden pestle, first alone, and then with 3 times their weight of refined sugar.

CONSTIPATION, (OF THE BOWELS.) Costiveness. When this is merely accidental or occasional, a dose of some cathartic is the only treatment necessary, but when it is *habitual*, it calls for further attention. The common causes of constipation are—The use of bread containing alum, and water containing lime; and the want of sufficient exercise. The treatment should consist in adopting a diet free from astringents, and consisting of a large portion of green vegetables and ripe fruit. Brown bread is frequently eaten for this purpose, and acts by the laxative nature of the bran it contains. The *occasional* use of laxative and emollient enemata may be had recourse to, but their habitual administration, as well as that of purgative medicines, by the mouth, is not to be recommended. The bowels, accustomed to the continual use of stimulants, act but languidly, or scarcely at all, without their application. In females, especially of the higher classes, the want of proper exercise is generally the chief cause of constipation. With such persons, a short walk two or three times daily will often do wonders, particularly if a little ripe fruit, a few raisins or tamarinds, or 2 or 3 drum figs, be occasionally eaten.

COPAIBA. *Syn.* CAPIVI. BALSAM OF CAPIVI. The best copaiba is that imported from Maracaibo and St. Martha, and is packed in casks containing from 1 to 1½ cwt. each, in large bottles, or in cylindrical tin boxes. Considerable variation exists in the color, consistence, and sp. gr., as well as in the proportion of oil and resin yielded by different samples, scarcely any two of which exactly agree. Even the odor, taste, and transparency vary considerably. Brazilian capivi is thin, clear, and pale; while the West Indian is thick, golden yellow, less transparent, and has a less agreeable and somewhat terebinthinate smell. Some varieties are opaque, and continue so, unless filtered. This is a most troublesome operation, unless well managed, and without proper precautions, frequently proves useless. The opacity generally arises from the presence of water, which is frequently found mixed with copaiba when first imported. This it retains with great tenacity. The following is the plan I have found to answer on the large scale. Place the casks upon their ends in a warm situation, and leave them so for a fortnight, or longer, if convenient. They may then be tapped *a little above the bottom*, when some of them will generally be found quite transparent, and may be drawn off and vatted, care being taken to avoid shaking up the bottom. Those that are foul must be filtered through one or more long Canton flannel bags, sunk in the bottom of a tin cistern, placed over a suitable receiver; a few pounds of coarsely-powdered charcoal being mixed up with the first 5 or 6 gallons thrown in. This will rapidly fill up the pores of the bag, and make the balsam flow clear and pale. The first runnings should be returned until it becomes perfectly transparent. The bottoms of the casks, containing the water or impurities, may be poured into a large can or jar, and allowed to deposite for a few days, when the copaiba may be poured off the top, and filtered. A sudden change of temperature will frequently turn a brilliant sample of this article opaque or milky; it is not, therefore, deemed fit to send out by the wholesale trade, unless it will "*stand*" this test. To ascertain this point, a common practice is to fill a small bottle with the copaiba, and to leave it out of doors all night in an exposed situation. (See also BALSAM OF COPAIBA.)

COPAIBA, ALKALINE TINCTURE OF. (LEWIS THOMPSON.) *Prep.* Dissolve 2 oz. of carbonate (formerly subcarbonate) of potassa in 1 pint of water, and add to this, balsam of copaiba in a thin stream, constantly stirring the mixture, until this, at first white and milky, becomes clear like jelly or amber, which will generally take place when about a pint of balsam has been added; set the mixture aside for two or three hours, then pour in two pints of spirit of wine, and mix the whole together; the solution is then fit for use, and may be flavored with any of the essential oils. Sweet spirit of nitre may be substituted for spirit of wine; but it is necessary to destroy its acidity by distillation from lime or potassa, otherwise a decomposition will take place.

This solution is compatible with iodide of potassium and nitrate of potassa, but is decomposed by all earthy, metallic, and ammoniacal salts, such as sulphate of magnesia, chloride of iron, acetate of ammonia, &c., which must not, therefore, be administered in conjunction with it. (Chemist, iv 510.)

COPAIBA AND KALI. *Prep.* Carbonate of potassa and water, of each equal parts; dissolve, and add gradually transparent balsam of copaiba until the fluid, at first milky, turns quite clear

COPAIBA CAPSULES. Gelatinous capsules filled with balsam of copaiba.

COPAIBA AND RHATANY, CAPSULES OF. Ricord has recommended capsules of copaiba, coated with extract of rhatany, as much superior to the common ones of copaiba alone, in the treatment of blenorrhœa. They may be easily prepared by either of the two following methods:

1. By immersing, for an instant, the common capsule in the following composition: or,

2. By forming the bodies of the capsules with the *composition*, instead of with *gelatin*, and following the same manipulations as for the manufacture of the common gelatin capsules.

The Rhatany Composition. Extract of rhatany, newly prepared from the root, 3 parts; sirup of moist sugar 1 part; mucilage of gum arabic 1 part. Melt the extract and reduce it in a water bath until sufficiently stiff, when cold; do the same with the sirup and gum; then mix them together while hot, but only in such quantity as may be used at one time.

These capsules are said to sit well upon the stomach, the tone of which they contribute to improve.

COPAIBA, MISCIBLE. *Prep.* Mix transparent balsam of copaiba with half its volume of liquor of potassa of double strength.

Remarks. Different samples of balsam often require *slightly* different quantities of the solution of potassa; it is therefore best to mix them gradually and cautiously together. Should the mixture be opaque, a *little* more, of one or other of the ingredients, as the case may be, will render it clear. No heat should be used. This article is miscible with water, with which it forms a kind of milk; and from containing *all* the volatile oil of the copaiba is a very valuable preparation. Its activity is considered equal to the balsam itself, and it is given in similar doses.

COPAIBA, MIXTURE OF. (Chopart.) *Prep.* Copaiba, alcohol, sirup of Tolu, peppermint water, orange-flower water, of each ℥ij; sweet spirits of nitre ʒij. *Proc.* Rub the copaiba with the sirup until perfectly mixed, then add the spirits, and lastly the waters.

COPAIBA, SOLUBLE. *Prep.* I. Heat miscible copaiba to the boiling point, pour it while hot into a "*separator*," and place it in some situation where it will cool slowly. After a few days draw off the clear portion from a cock or hole placed *near* the bottom of the vessel, observing to stop the stream before any of the floating oil begins to flow through. *A very little* concentrated liquor of potassa added before applying the heat, will render it more soluble. *Prod.* Thick, clear, and soluble in *pure* water. Resembles copaiba in appearance.

II. Agitate balsam of copaiba with an equal measure of liquor of potassa, (P. L.;) boil for a few minutes in a clean tinned copper pan, then pour it into a separator, and proceed as before. Thinner than the last.

COPAIBA, SPECIFIC SOLUTION OF. (Frank's.) *Prep.* I. Balsam of copaiba 2 parts; liquor of potassa (P. L.) 3 parts; water 7 parts; boil it for 2 or 3 minutes, put it into a separator, and allow it to stand for 5 or 6 days, then draw it off from the bottom, avoiding the upper stratum of oil. To the clear liquid add 1 part of sweet spirits of nitre, perfectly free from acid, to which a few drops of liquor of potassa has been added, until it slightly browns turmeric paper; should it turn foul or milky, a *very little* liquor of potassa will usually brighten it; if not, place it in a clean separator for a few days, and draw it off from the bottom as before, when it will be perfectly brilliant without filtering.

Remarks. Some persons add the sweet spirits of nitre while the solution is still hot, mix it in as rapidly as possible, and immediately cork or fasten up the vessel. This is a good way when the article is wanted in a hurry, but is objectionable from the loss of spirit thereby occasioned, and the danger, without care, of bursting the separator.

A receipt for this article, upon the authority of Battley, has been going the round of the pharmaceutical works for some years, but which produces a preparation not at all resembling "*Frank's specific solution.*" It is as follows: "Take 12 oz. of balsam of copaiba and 6 oz. of calcined magnesia; rub together, add a pint of proof spirit, filter, and then add ½ oz. of sweet spirits of nitre." (Gray's Supplement.) I have tried this formula, and I find the product to be a white tincture, scarcely flavored with copaiba, and perfectly limpid. No sooner is balsam of copaiba mixed with half its weight of magnesia, than the two unite, and produce a compound insoluble in spirit of wine. Such is the affinity of this earth for copaiba, (copaibic acid,) that it will even take it from caustic potassa. Thus I find the solution of this balsam, (containing potassa,) if filtered through blotting-paper, with a little magnesia, becomes so strongly alkaline as to materially injure its quality, while a glutinous mass is deposited upon the sides and bottom of the paper. I have been led to a notice of this subject, from well knowing that many druggists have adopted this formula, and have been disappointed with the results, which are, however, only such as might be reasonably anticipated.

COPAIBA, SALT OF. *Syn.* Sal Copaibæ. There are two preparations bearing this name, the one, copaibic acid, and the other, copaibate of an alkali. They are both sold at ridiculously high prices. The advertisement of one of these preparations is heralded in with the following pseudo-philosophical announcement:

"*This preparation* of copaiba, in its chemical and medical analogies, may be compared to quinine from bark, the former being the tonic of the mucous membranes, and the latter that of the dermoid structures.

"*This salt* contains all the properties of the balsam of copaiba in a very concentrated form, without its nauseating qualities, and from this circumstance it may be administered to the most delicate constitution."

It is the general opinion of medical men, that the active properties of copaiba reside in a volatile or essential oil, of which the *above preparation is destitute*. It is therefore difficult to conceive how, in *this* instance, the reverse should be the case. I can speak from my own experience, and that of several high authorities to whom I have referred, that both the viscid and acid resins of copaiba are almost inert, and that all the alkaline preparations of these substances are nearly similar. I have taken the "sal copaibæ" myself, and have watched its action on others, but have not been able to

perceive any good effects to result from its administration.

COPAIBIC ACID. *Syn.* Capivic Acid. The yellow brittle resin of balsam of copaiba. It is prepared by digesting the resin (left after distilling the oil from the balsam) in alcohol, which dissolves the acid resin, but leaves the viscid one. It may be purified by re-solution in alcohol. It forms about 50% of the balsam.

Prop. An amber-colored, brittle, semi-crystalline, resinous substance, soluble in alcohol, ether, and oils, reddens litmus paper, and forms salts with the bases, called copaivates. These may generally be made by dropping into a solution of the acid in alcohol, an alcoholic solution of a soluble salt of the base. The copaivates of potash, soda, and ammonia are easily prepared, by adding to an alcoholic solution of the acid another of the pure alkali, until it be neutralized, when the salts may be obtained by careful evaporation. Copaivate of silver is formed by neutralizing the acid with nitrate of silver, both being dissolved in alcohol, and then adding a little liquor of ammonia, when a white crystalline precipitate will subside. The copaivates of lead, lime, and iron, as well as several others, may be made in a similar manner.

Copaivate of magnesia may be made by adding copaivate of potassa to a solution of epsom salts. All these salts are easily decomposed by acids.

COPAL. *Syn.* Gum Copal. A resinous substance, which exudes spontaneously from the Rhus copallinum, and the Elæocarpus copalifer. When of good quality, it is too hard to be scratched by the nail, and has a conchoidal fracture. It dissolves with difficulty, and this, combined with its extreme hardness, renders it very valuable for making varnishes.

Solvents. I. *Caoutchoucine;* sparingly. II. Equal parts of *caoutchoucine* and *alcohol*, of ·825; freely soluble in the cold. III. *Absolute alcohol*, added gradually to the copal, previously rendered gelatinous by water of ammonia, assisting the union with heat. IV. *Alcohol* added to the copal, previously softened with ether. V. *Absolute alcohol* 1½ parts, digested on copal 1 part for 24 hours. (Unverdorben.) VI. *Alcohol*, to which a little camphor has been added. VII. *Ether;* and this solution may be diluted with alcohol. VIII. *Oils of rosemary* and *lavender*, (spike;) too expensive for general use. IX. *Copal*, heated until it fuses, acquires the property of dissolving in turpentine and alcohol. X. *Copal*, reduced to powder and exposed for some time to the air, also becomes soluble in alcohol and turpentine. XI. *Drying linseed oil*, at nearly the boiling point, dissolves copal, and will bear dilution with spirits of turpentine as soon as it has cooled sufficiently. This is the common way of making copal varnish. XII. *Ammonia* enables oil of turpentine to dissolve copal; but it requires such nice management of the fire, that it seldom succeeds completely. (Lewis.) XIII. *Powdered copal*, triturated with a little camphor, softens and becomes a coherent mass; and camphor, added either to alcohol or oil of turpentine, renders it a solvent of copal. ½ oz. of camphor is sufficient for 1 quart of oil of turpentine, which should be of the best quality; and the copal, about the size of a large walnut, should be broken into very small pieces, but not reduced to a fine powder. The mixture should be set on a fire so brisk as to make it boil almost immediately The vessel should be of tin or other metal, strong, shaped like a wine-bottle with a long neck, and capable of holding 2 quarts. The mouth should be stopped with a cork, in which a notch is cut to prevent the vessel from bursting. (Sheldrake.) XIV. A good varnish may be made by pouring upon the purest lumps of copal, reduced to a fine mass in a mortar, colorless spirits of turpentine, to about one third higher than the copal, and triturating the mixture occasionally in the course of the day. Next morning it may be poured off into a bottle for use. Successive portions of oil of turpentine may thus be worked with the same copal mass. (Varley, Tilloch's Mag. 51.)

⁂ In all the above cases the copal should be reduced to a *coarse* powder. A *fine* powder is apt to stick together and form hard lumps. The solution of copal, even in its most ready solvents, is attended with some difficulty, and frequently miscarries in the hands of the inexperienced. A mixture of caoutchoucine and alcohol (as in No. II.) is an exception.

COPAL, MELTED. Obtained by holding the gum before a good fire, so that as soon as the copal melts, it may drop into a pan of water: a kind of oil separates from it, and the copal becomes soluble in spirits of wine, and still more so if the melting is repeated.

COPAL, POWDERED. Copal reduced to powder and exposed to the air in a thin stratum, on sieves covered with paper, for 3 or 4 months. Soluble in alcohol.

COPPER. (From *cuprum*, a corruption of κύπρος, from the island of Cyprus, whence it was formerly brought.) A red-colored metal, too well known to require description.

Hist. Copper and its alloys appear to have been known to the most remote ages of antiquity. Brass, an alloy of copper, is mentioned by Moses (Job, xxviii.) upwards of 1600 years before the birth of Christ. (Hales.) This metal is found in the metallic state, and in combination with oxygen, sulphur, acids, and other minerals, and in the organic kingdom, in the ashes of plants, and in the blood of animals. (Sarzeau.) The copper of commerce is principally prepared from copper pyrites, a mixed sulphuret of iron and copper, found in Cornwall, and other parts of the world.

Prep. Copper is only prepared from its ores on the large scale. The copper pyrites is first roasted, and then smelted, by which process "*coarse metal*" is produced; this is again submitted to calcination and smelting, when "*fine metal*" is obtained. It afterwards undergoes the process of refining and toughening.

Prop. This metal is malleable and ductile. It has a specific gravity of 8·8 to 8·9, fuses at about 2000° Fahr., and volatilizes at higher temperatures. It forms numerous compounds, all of which are more or less poisonous.

Char. and Tests. The solutions of copper possess a blue or green color, and yield a blue precipitate with soda or potassa. Ammonia produces a bluish-white precipitate, soluble in an excess of the precipitant, forming a deep blue solution. Prussiate of potash gives a reddish-brown precipitate, sulphureted hydrogen and hydrosulphurets, a black

ma. · A polished iron plate, immersed in an acidulous solution of copper, becomes coated with that metal.

Estim. The quantity of copper present in any compound, may be estimated by throwing it down from its solution by pure potassa, after which it must be carefully collected, washed, dried, ignited, and weighed. This will give the quantity of the oxide from which its equivalent of metallic copper may be calculated; every 5 parts of the former being (as near as possible) equal to 4 of the latter. Copper may also be precipitated at once in the metallic state, by immersing a piece of polished steel into the solution, but this method will not give very accurate results. Copper may be separated from lead by adding sulphuric acid to the nitric solution, and evaporating to dryness, when water digested on the residuum will dissolve out the sulphate of copper, but leave the sulphate of lead behind. From this solution the oxide of copper may be thrown down as before. Copper may be separated from zinc by sulphureted hydrogen, which will throw down a sulphuret of copper, which may be dissolved in nitric acid, and treated as above.

Uses. The applications of copper in the arts are too well known to require notice. In medicine, 3 or 4 grains of the filings were formerly given in rheumatism, and to prevent hydrophobia.

Ant. Copper in the metallic state appears to be inert, but most of its compounds are poisonous. The antidotes are, the white of egg, milk, or flour mixed with water. Iron filings (Payen, Chevallier, Dumas) and the prussiate of potash have also been recommended. A drachm or more of the latter may be taken dissolved in water, and ½ oz. or more of the former, ad libitum. Sugar has also been proposed as an antidote. (Duval, Postel.)

COPPER, ALLOYS OF. With *zinc* copper forms *brass;* with *tin, bronze, bell,* and *cannon metal.* An alloy made with 100 parts of copper and 50 of tin, forms *speculum metal. White copper* is formed by the addition of metallic arsenic, and *German silver* is a mixture of nickel, zinc, and copper. See these articles in their alphabetical places.

COPPER, ACETATES OF. I. (*Neutral Acetate. Syn. Distilled Verdigris. Binacetate of Copper. Crystallized Verdigris.*) *Prep.* Dissolve verdigris in vinegar, with the aid of heat, and crystallize. It forms dark green or blue crystals.

II. (*Diacetate. Syn. Verdigris. Ærugo.*) Formed by exposing sheets of copper to the vapor of acetic acid, in a warm situation. (See VERDIGRIS.) It forms a green or bluish-green powder.

III. (*Sesquibasic Acetate.*) The blue portion of verdigris, soluble in water.

IV. (*Trisacetate.*) The green insoluble portion of verdigris.

COPPER, ARSENITE OF. *Syn.* SCHEELE'S GREEN. *Prep.* Mix a solution of 2 parts of sulphate of copper in 44 of water, with a solution of 2 parts of potash of commerce, and 1 of pulverized arsenious acid, also in 44 of water. Both solutions being warm, the first is to be gradually poured into the second. The grass-green insoluble precipitate is to be washed with water.

COPPER, AMMONIURETED. *Syn.* CUPRO-SULPHATE OF AMMONIA. AMMONIATED COPPER, (P. E.) *Prep.* (*Ammonio-sulphate of Copper,* P. L.) Sulphate of copper ℥j; sesquicarbonate of ammonia ℥iss. Rub them together until carbonic acid ceases to evolve, then wrap it up in bibulous paper and dry it in the air.

Prop. By heat ammonia is evolved, and oxide of copper remains. Its aqueous solution changes the color of turmeric, and a solution of arsenious acid renders it green. (P. L.)

Uses. Employed in pyrotechny. It has been given in doses of ½ to 5 grs. in chorea, epilepsy, hysteria, &c., but it is principally employed as an injection and as a collyrium, in opacity of the cornea.

Remarks. Great care must be taken in drying this article, as it is apt not only to lose a large portion of its weight, but become of an inferior color. Both the ingredients should be separately reduced to powder before mixing.

COPPER, BEAN-SHOT. *Prep.* Melt copper, and pour it in a small stream into boiling water. It is in small lumps like peas or beans, hence its name.

COPPER, BLANCHED. *Prep.* Fuse copper with $\frac{1}{16}$ of its weight of neutral arsenical salt, under a flux of calcined borax, charcoal, and powdered glass.

COPPER, CARBONATE OF. *Syn.* DICARBONATE OF COPPER. MINERAL GREEN. *Prep.* Add a solution of carbonate of soda or potassa to a hot solution of protosulphate of copper.

Remarks. The beautiful green mineral called *malachite,* is a hydrated dicarbonate of copper. If the solution of copper in the above formula be employed cold, the precipitate has a bluish-green color. (See VERDITER.)

COPPER, CHLORIDES OF. *Prep.* I. (*Subchloride. Syn. Dichloride of Copper. Resin of ditto. White muriate of ditto.*) Distil a mixture of 1 part of copper filings, with two parts of corrosive sublimate.

II. (*Chloride. Syn. Muriate of Copper. Hydrochlorate of ditto. Protochloride of ditto.*) Dissolve protoxide of copper in muriatic acid, evaporate and crystallize.

Remarks. This salt forms green needles, is deliquescent, soluble in alcohol, and when heated, (under 400°,) loses its water, and becomes anhydrous chloride of copper, and assumes the form of a yellow powder. The first of these preparations is sometimes called the protochloride or muriate; the second the deutochloride.

COPPER, CHROMATE OF. *Prep.* Precipitate a salt of copper, with neutral chromate of potash; or dissolve hydrated peroxide or carbonate of copper in chromic acid. Caustic ammonia dissolves this salt, forming a magnificent dark-green liquid, from which, by the admixture of spirit of wine, ammonio-chromate of copper, or cupro-chromate of ammonia, is disengaged in the form of a powder of a splendid, rather dark-green appearance. The readiest way of preparing this permanent and beautiful color, is to add solution of chromate of potash to ammoniacal sulphate of copper.

COPPER, FEATHER-SHOT. *Prep.* Melted copper, poured in a small stream into cold water. It forms small pieces, with a feathered edge, hence the name. It is used to make solution of copper.

hardness of the different substances is measured by the power they possess of cutting or scratching other substances.

GEMS, FACTITIOUS. These are made of very pure, fusible, transparent and dense glass, usually termed *paste* or *strass*, which is mostly formed of oxide of lead, potassa and silica, with small quantities of other ingredients to increase the brilliancy and clearness. The tints are imparted by the addition of metallic oxides. The beauty of artificial stones and gems, depends upon the tint of the *real* stones being exactly imitated, and upon proper care and skill being exercised in the cutting, polishing, and setting of them in their cases. All the colored glasses, and enamels, may be worked up into artificial gems. (See ENAMELS, FOILS, PASTES, &c.)

GENEVA. (From *genièvre*, juniper.) Hollands gin. (See HOLLANDS.)

GENTIANINE. A peculiar substance obtained by MM. Henry and Caventou from the root of the common officinal gentian, (gentiana lutea.)

Prep. I. Digest powdered gentian root in ether for 2 or 3 days with agitation, filter, evaporate, dissolve in alcohol, filter, and again evaporate; redissolve in alcohol or ether, filter, and crystallize.

II. Digest gentian root (in powder) in ether for two days and nights, filter, evaporate nearly to dryness; add alcohol to the yellow crystalline mass thus obtained until it no longer becomes colored; evaporate to dryness, redissolve in weak alcohol, filter, evaporate again to dryness; dissolve in water, add some calcined magnesia, boil, filter, digest the sediment in ether, and evaporate.

Remarks. Gentianine forms golden yellow crystals, scarcely soluble in water, very soluble in alcohol and ether. It is a strong aromatic bitter, in doses of gr. ij; the tincture is mostly used. According to the researches of Trommsdorff and Leconte, the above substance is composed of *gentisin*, *gentianite*, and sugar.

GENTIANITE. THE BITTER PRINCIPLE OF GENTIAN. It has not been obtained in a state of purity. It may be procured combined with a portion of sugar, by digesting the alcoholic extract of gentian in water, throwing down the gentisin with lead, passing sulphureted hydrogen through the liquid to remove any traces of lead, filtering and evaporating. It may be further purified by digestion in ether.

GENTISIN. *Syn.* GENTISIC ACID. This is obtained from the alcoholic extract of gentian by digestion in water, and in alcohol, evaporating the tincture, and treating the residuum with ether. By repeated re-solutions in alcohol it may be obtained under the form of pale yellow needles. It forms salts with the bases.

GILDING. *Syn.* DORURE, (*Fr.*) VERGOLDUNG, (*Germ.*) The art of covering the surfaces of bodies with a thin film of gold, for the purpose of increasing their durability or improving their appearance.

GILDING, BOOK. *The gilt letters and figures on the leather, cloth, and silk covers of books*, are formed by sprinkling or dusting finely powdered gum mastich over the surface to be gilded; an iron or brass tool bearing the design upon its face is then heated to a proper temperature, and pressed upon a piece of leaf gold, which slightly adheres to it; the two are then transferred to the cover, and the tool is gently pressed on it, by which means the mastich softens, and retains the gold. The loose gold and powdered mastich are then dusted off with a brush. The gold will adhere to leather without the use of mastich, but the gilding is conceived to be more durable when it is employed.

The edges of the leaves of books and reams of paper are first cut perfectly smooth in the cutting press, and then thinly washed with a solution of isinglass in weak spirit, or with a varnish made of 4 parts of Armenian bole and 1 part of powdered sugar-candy, mixed up to a proper consistence with white of egg. The coating is allowed to dry, and is then smoothed with a wet rag, after which the gold leaf is applied and polished with the burnisher.

GILDING, BUTTON. This species of gilding has been already noticed. (See p. 149.) I shall, therefore, only remark here, that when the process is properly conducted, 12 dozen (1 gross) of buttons, of one inch in diameter, may be perfectly gilded on both sides with only 5 grains of gold. By an Act of Parliament, which I believe is still unrepealed, this is the smallest portion of gold permitted to be used for a gross of buttons of the above size, but a less quantity than 5 grains is frequently employed. The mass of the *finest* kind of buttons, and other small articles, have, however, during the last few years been gilded by means of a solution of chloride of gold in bicarbonate of potassa. (See Elkington's PATENT GILDING.)

GILDING, BURNISHED. This is principally applied to the frames of pictures and mirrors, and to similar objects. It is performed by giving the wood, first, a coating of good size, and next, several successive coats of size thickened with finely-powdered whiting, Spanish white, or plaster of Paris, until a good face is produced; observing to let each coat become quite dry, and to rub it perfectly smooth with fine glass-paper, before the application of the following one. When the proper 'face' is obtained, the surface is thinly and evenly gone over with gold size, and when this is *nearly* dry, the gold leaf is applied and afterwards burnished.

GILDING, CHEMICAL. This term is applied to those methods of gilding in which the gold adheres to the surface from chemical affinity, and not from the intervention of some glutinous substance. The latter method is called, by way of distinction, "mechanical gilding."

GILDING, COLD. This is performed by softening, annealing, and polishing the articles (copper or brass) to be gilded, and then applying the following powder by friction with a piece of cork moistened with a solution of salt in water; after which the work is burnished with a piece of hematite or polished steel.—*Powder:* Pure gold 5 drs.; pure copper 1 dr.; nitro-muriatic acid 10 oz.; dissolve, imbue clean linen rags with the solution, dry, burn them and carefully collect the ashes, which contain the gold in a state of minute division.

GILDING, DISTEMPER. This is a method practised by the French, that resembles BURNISHED GILDING, excepting in being *vastly* more complicated. This, as well as Burnished Gilding, is applied to wood, plaster, and marble.

GILDING, ELKINGTON'S PATENT. *Syn.* Bonnet's Process. Anglo-German Gilding. *Proc.* 1. (*The Gilding liquid.*) Fine gold 5 oz. (troy;) nitro-muriatic acid 52 oz. (avoirdupois;) dissolve by heat, and continue the heat until red or yellow vapors cease to be evolved; decant the clear liquid into a suitable vessel; add *distilled* water 4 gallons; pure bicarbonate of potassa 20 lbs.; and boil for two hours. *** The nitro-muriatic acid is made with *pure* nitric acid (sp. gr. 1·45) 21 oz.; *pure* muriatic acid (sp. gr. 1·15) 17 oz.; and *distilled* water 14 oz.

2. (*The Gilding.*) The articles, after being perfectly cleaned from scale or grease, and receiving a proper *face*, are to be suspended on wires, dipped into the liquid *boiling hot* and moved about therein, when, in from a few seconds to a minute, depending on the newness and strength of the liquid, the requisite coating of gold will be deposited on them. By a little practice the time to withdraw the articles is readily known; the duration of the immersion required to produce any given effect gradually increases as the liquid weakens by use. When properly gilded, the articles are withdrawn from the solution of gold, washed in clean water, and dried; after which they undergo the usual operation of coloring, &c. (See Gilding, wash.) A dead appearance is produced by the application to the articles of a *weak* solution of nitrate of mercury previously to the immersion; or the *deadening* may be given by applying a solution of the nitrate to the *gilded* surface and then expelling the mercury by heat. (This process, though patented by Mr. Elkington in England, and claimed as *his own* invention, was in reality discovered and first practised by M. Bonnet, a foreigner.) Articles thus gilded do not bear friction and the operations of being put in color, (mise en couleur,) so well as those gilded by the mercurial process, or even by electricity.

GILDING, FRICTION. This consists in the application, by friction, of gold in a minutely divided state, to the surface of the copper or brass, previously cleaned and brightened. (See Gilding, Cold.)

GILDING, GRECIAN. *Proc.* Sal ammoniac and corrosive sublimate, equal parts, are dissolved in nitric acid, and a solution of gold made with this menstruum; after slight concentration the liquid is applied to the surface of silver, which immediately becomes black, but on being heated exhibits a gilded surface.

GILDING, JAPANNER'S. This is done by covering the surface with oil size thinned with spirits of turpentine, and then gently daubing on gold powder with a puff of wash-leather. This gives the appearance of frosted gold. (See Gilding Powder.)

GILDING, LEAF. This term is applied to the gilding of paper, vellum, &c., by applying leaf gold to the surface, previously prepared with a coating of gum-water, size, or white of egg. It is usually finished with an agate burnisher.

GILDING, LETTER. The letters of signboards and similar ornamental gilding for outdoor work, is done by first covering the design with yellow or gold-color paint, then with oil gold size, and when this is *nearly* dry applying the leaf-gold, observing to shield it properly from the wind, lest it be blown away or become crumpled before being properly attached. This gilding is usually varnished.

GILDING LIQUOR. *Syn.* Gilder's Pickle *Prep.* Alum and common salt, of each 1 oz.; purified nitre 2 oz.; water ½ pint; used to impart a rich color to gold surfaces, principally trinkets. Its application should not be too long continued, as it dissolves a small portion of the gold. For common purposes it is best used diluted with water

GILDING METAL. The metal employed for gilding is usually brass, or a mixture of brass and copper. The following alloys have been recommended:—

I. Copper 6 parts; brass 1 part.

II. Copper 4 parts; Bristol brass 1 part.

III. Copper 13 parts; old Bristol brass 3 parts; tin 14 parts.

GILDING OF LEATHER. The finer class of leather gilding has been already noticed under Book Gilding. For common work, *silver* leaf is usually applied to the surface, previously covered with size or white of egg, and after being burnished down and dried is covered with gold-colored lacquer. Tinfoil is frequently employed for inferior work, or such as is not required to be elastic.

GILDING, OIL. This species of gilding may be divided into several operations.—1. The surface is prepared by a coating of whitelead in drying oil. —2. Another coat is given, made with calcined whitelead or masicot ground in linseed oil and turpentine; 3 or 4 coats of this mixture are often given, observing to carefully smooth off each coat with pumice or shave grass before the application of the following ones.—3. The *Gold Color*, or paint, is next applied. It is usually very adhesive gold size, or the bottom of the pot or dish in which painters wash their brushes. For this purpose it is thoroughly ground and strained.—4. When the gold color becomes partially dry and sufficiently tenacious, the gold-leaf is applied and pressed on with a wad of cotton, wood, or a soft brush.—5. A thin coat of spirit varnish is now given, and the object is cautiously passed over a chafing dish of charcoal, observing to avoid stopping the motion of the piece while doing so, as it would then become discolored and blistered. The work is usually finished off with a coat of pale oil varnish. For outdoor gilding, the whole of the varnishing process is generally omitted. This species of gilding is applied to woodwork, plaster, metal, &c.

GILDING OF POLISHED METALS. I. *Polished iron and steel* may be readily gilded by applying an ethereal solution of gold to the surface with a camel-hair pencil. The ether flies off and leaves the surface coated with gold; it must then be polished with a burnisher. In this way, any fancy device or writing may be executed on steel or iron. This species of gilding is not, however, so durable as the following:—

II. Apply gold leaf to the surface of polished iron, steel, or copper, heated to a bluish tint, press it on gently with the burnisher, avoiding breaking or injuring the gold; again expose it to a gentle heat, and repeat the process with fresh leaves of gold, until the gilding has acquired a proper thickness; then let it cool and polish it with the burnisher. (See Gold, Liquid.)

GILDING OF PORCELAIN, GLASS, &c

This is performed by blending powdered gold with gum water and a little borax, and applying it by means of a camel-hair pencil; the article is then heated sufficiently hot in an oven or furnace, by which means the gum is burnt, and the borax vitrifying cements the gold to the surface. When cold it is polished off with a burnisher. Names, dates, or any fancy device may thus be permanently and easily fixed on glass, china, earthenware, &c.

GILDING OF SILK, &c. *Silks, satins, woollens, ivory, bone, &c.*, may be readily gilded by immersing them in a solution of nitro-muriate (terchloride) of gold, (1 of the salt to 3 or 4 of water,) and then exposing them to the action of hydrogen gas. The latter part of the process may readily be performed by pouring some diluted sulphuric acid, or zinc or iron filings, in a bottle, and placing it under a jar or similar vessel, inverted, at the top of which the articles to be gilded are to be suspended.

The foregoing experiment may be very prettily and advantageously varied as follows:—Paint flowers or other ornaments with a very fine camel-hair pencil, dipped in the above-mentioned solution of gold, on pieces of silk, satin, &c., and hold them over a Florence flask, from which hydrogen gas is evolved, during the decomposition of the water by sulphuric acid and iron filings. The painted flowers, &c. in a few minutes will shine with all the splendor of the purest gold. A coating of this kind will not tarnish on exposure to the air, or in washing.

GILDING OF SILVER. Silver is usually gilded by brushing it evenly over with an amalgam of gold, submitting it to heat and burnishing. (See GILDING, WASH.)

GILDING POWDER. *Syn.* GOLD POWDER. GOLD BRONZE. *Prep.* I. Heat an amalgam of gold until the mercury be all volatilized. If the quantity be considerable, the process should be so conducted as to save the mercury.

II. Dissolve gold in nitro-muriatic acid, then precipitate it with a solution of pure protosulphate of iron; wash and dry the powder. A good process.

III. Grind gold leaf with honey by means of a stone and muller, until reduced to an impalpable powder, then wash away the honey and dry the gold.

Uses, &c. Powdered gold is employed in gilding by the japanners and by artists. It is either sold in powder or made up into shells. (See GOLD POWDER.)

GOLD SHELLS. The previous article ground up with gum water, and spread upon the insides of shells. Used by artists.

GILDING SIZE. *Syn.* GILDER'S SIZE. GOLD SIZE. GOLD COLOR. *Prep.* I. (*Oil size.*) Drying or boiled oil thickened with yellow ochre, or calcined red ochre, and carefully reduced to the utmost smoothness by grinding. It may be thinned with oil of turpentine. Improves by age. Used for *oil* gilding.

II. (*Water size.*) Parchment or isinglass size, mixed with finely-ground yellow ochre. Used in *burnished* or *distemper* gilding.

GILDING, TALBOT'S PATENT. By this process, gilding, silvering, and platinizing are performed by adding a solution of gallic acid in water ether, or alcohol, to a solution of gold, silver or platina, and immersing therein the metallic substances to be gilded, which must be allowed to remain immersed until sufficiently coated. The articles must be well cleaned and polished before being placed in the solution.

GILDING, THREAD. *Gold thread* is merely a thread of yellow silk covered with a very thin flatted wire of gold, by means of a properly arranged revolving wheel.

GILDING, VARNISH. This is oil gilding applied to equipages, picture-frames, furniture, &c., the surface being highly varnished and polished before it receives the size or gold color; and after the gilding has become quite dry, a coat of spirit varnish, fumed with the chafing-dish as above, is applied, followed by 2 or 3 coats of the best copal varnish, after which the work is carefully polished with tripoli and water. (See FURNITURE, VARNISHED.)

GILDING VARNISH. *Syn.* GILDER'S VARNISH. GILDER'S WAX. *Prep.* Beeswax 4 oz.; verdigris and sulphate of copper, of each 1 oz.; mix.

II. Beeswax 4 oz.; verdigris, red ochre, and alum, of each 1 oz.; mix. Used to give a red gold color to water-gilding.

GILDING, VOLTAIC. Gilding by the moist way; or by communicating a negative electric state, by means of a feeble hydro-electric current to the metal which is sought to be gilded, and which is immersed in a dilute solution of gold.

Proc. I. Pour a neutral solution of chloride of gold, containing not more than from ½ to 1⅝ of gold into a glass cylinder, whose lower extremity is hermetically closed with moistened gut-skin, and introduce the cylinder into a vessel which contains some water very slightly acidulated with a few drops of sulphuric acid. The cylinder should be supported so as to prevent its lower surface from resting immediately on the bottom of the larger vessel. It is necessary to carefully clean, or even polish, the surface of the metal, whether of silver or brass, that we desire to gild, lest a portion of it should be left ungilt. To attain this end, it is sometimes advisable to place the metal for a few moments in contact with zinc, in dilute sulphuric acid, so that hydrogen may be disengaged on its surface; after which it must be well washed. In order to gild an object, it must be fixed or suspended by a platina wire, to the other extremity of which is attached a plate of zinc; this done, plunge the article to be gilt in the solution of gold, and the zinc plate into the acidulated water. The power of the electric current may be moderated at will, by immersing more or less of the zinc plate, so that no hydrogen may be disengaged, and in this case the chloride of gold is alone decomposed. After a minute, the article to be gilt is withdrawn, wiped dry with a fine linen cloth, rubbed a little, and again immersed. After two or three immersions the metal will be found to be sufficiently gilded. (M. de la Rive.)

II. (*Process of M. Louyet.*) This consists in employing a strong solution of bisulphuret of gold in cyanuret of potassium and a powerful electric current. The bisulphuret is prepared by either passing sulphureted hydrogen through a solution of bichloride of gold, or by adding to a solution of the latter another of hydrosulphuret of ammonia.

II. Sassafras chips 1 lb.; ginger bruised 4 oz.; water 3 gallons; simmer until reduced to 2 gallons; then add treacle 16 lbs., rectified spirits 7 lbs., and laudanum 1 pint.

III. Opium ½ oz.; treacle 5 lbs.; boiling water 1 gallon; dissolve, and add rectified spirit ½ pint; oil of sassafras ½ dr.; cloves, mustard seed, of each ...; corianders and caraway seeds, of each 1 dr.; digest for a week.

IV. Caraway, corianders, and aniseed, of each ...; water 6 gallons; distil 5 gallons, and add treacle 28 lbs.; mix, then add laudanum 1 quart, and oil of sassafras 1 oz. previously dissolved in rectified spirit 1 gallon.

Remarks. The above forms are those commonly sent in the drug trade. This cordial is anodyne and narcotic, and is commonly given to children troubled with wind or colic. Its frequent and excessive use has sent many infants prematurely to the grave. Gray says, "*It is chiefly used to prevent the crying of children in pain or starving.*" The dose is ¼ of a teaspoonful and upwards, according to the age of the child.

CORDIAL, GOUT. *Prep.* Rhubarb, senna, coriander seed, sweet fennel seed, and cochineal, of each 2 oz.; liquorice root and saffron, of each 1 oz.; raisins 2½ lbs.; rectified spirit of wine 2 gallons; digest for 14 days. Used in gout and rheumatism. *Dose.* 1 tablespoonful to ½ oz. It is stomachic and slightly laxative.

CORDIAL, HORSE. *Prep.* Compound tincture of benzoin 1 pint; compound spirit of ammonia and sweet spirits of nitre, of each 8 oz.; mix; put up in Bateman's bottles, and seal them.

CORDIAL LEMON. *Prep.* Digest 2 oz. each of fresh and dried lemon peel, and 1 oz. of fresh orange peel in 1 gallon of proof spirit for a week; strain with expression, add clear soft water to reduce it to the desired strength, and lump sugar in the proportion of 2½ lbs. to 3 lbs. to the gallon. The addition of a little orange-flower or rose-water improves it.

CORDIAL, LOVAGE. *Prep.* Fresh roots of lovage 2 oz.; fresh roots of celery and sweet fennel, of each 1 oz.; essential oil of caraway ¼ oz.; proof spirit 3 gallons; digest for 7 days, add water 1 gallon; distil off 2½ gallons; add water to make it of the desired strength, and sweeten with sugar. To the above ingredients some persons add, before distillation, ¾ oz. of fresh valerian and 1 drachm of oil of savine.

CORDIAL, NERVOUS. (BRODUM'S.) *Prep.* Tinctures of gentian, calumba, cardamoms, and senna, compound spirits of lavender, and steel wine, of each equal parts. Tonic and stomachic.

CORDIAL, ORANGE. Like lemon cordial, ... fresh orange peel to the gallon.

CORDIAL, PEPPERMINT. *Syn.* SPORTSMAN'S CORDIAL. EAU DE CHASSEURS. *Prep.* Add English oil of peppermint 2 oz. to rectified spirit of wine 1 quart, agitate well in a corked bottle, capable of holding 3 pints or more, then pour it into a cask having a capacity of upwards of 100 gallons; add 36 gallons of perfectly white and flavorless proof spirit, agitate well for 10 minutes, then add 2 cwt. of the best refined lump sugar, previously dissolved in twice its weight of pure filtered rain water; rummage well, and further add sufficient clear rain water to make up the whole quantity to exactly 100 gallons; again rummage well; add 2 oz. alum, dissolved in 1 quart of rain water, and a third time agitate for 15 minutes, after which put in the bung and let it stand for a fortnight, when it will be fit for sale.

Remarks. The above produces a beautiful article, provided the oil of peppermint be of good quality, the sugar double refined and stove-dried, and the cask one that will not give color. To ensure the *first*, the oil should be purchased of some known respectable dealer. That prepared at Mitcham, Surrey, and hence called "*Mitcham oil of peppermint*," is not only the strongest but best flavored, and though more than double the price of the foreign oil, is, in the long run, much the cheapest. *The sugar* should be sufficiently pure to dissolve in a wine glassful of clear soft water, without injuring its *transparency*, and the *cask* should be a fresh-emptied gin pipe, or one properly prepared for gin, as if it give color it will spoil the cordial. If these particulars be attended to, the product will be a *clear transparent* liquor as soon as made, and will not require fining; but should there be the slightest opacity, some alum may be added as above, which will clear it down. Some persons add more oil of peppermint, others less, than the quantity I have ordered, but this, as well as the weight of sugar, must depend upon the taste of the purchasers, and the price the liquor is to be sold at. The product is 100 gallons of cordial at 64 u. p., which is the strongest usually sent out. A similar plan may be followed for the manufacture of any other cordial liquor, the same principles and operations being common to all.

CORDIAL, SIR WALTER RALEIGH'S. *Syn.* SIR W. RALEIGH'S CONFECTION. AROMATIC DO. *Prep.* Fresh summits of rosemary and juniper berries, of each 1 lb.; cardamom seeds, zedoary, and saffron, of each ½ lb.; proof spirit 1½ gallons; digest for a fortnight, express and strain; evaporate to 2½ lbs. and add Gascoigne's powder 1 lb.; cinnamon and nutmegs, of each 2 oz.; cloves 1 oz., white sugar 2 lbs., mix well together.

Remarks. The above formula is that for the original aromatic confection. Sir Walter Raleigh's own receipt was far more complicated.

CORDIAL, SPORTSMAN'S. *Syn.* EAU DE CHASSEURS. *Prep.* Peppermint water and rectified spirits of wine, of each 1 pint; lump sugar ½ lb. Dissolve the sugar in the water and add it to the spirit.

CORDIAL, WARNER'S. *Prep.* Rhubarb ℥j; senna ℥iss; saffron ʒj; liquorice root ʒiv; raisins lb. j; rectified spirit lb. iij: digest for a fortnight. Laxative.

CORK. *Syn.* CORKER. The lichen omphalodes made into balls. Used to dye wool.

CORKS. The common practice of employing inferior corks for the purpose of stopping the mouths of bottles, is often productive of considerable loss, from the air being only partially excluded, and the contents suffering in consequence. I once saw a large "*bin*" of valuable wine become, in less than a year, little better than sour Cape, from the parsimony of its owner on this point, and I have frequently had to regret the loss of valuable chemical preparations from a similar cause. The best corks are those called "*velvet corks*," and of these the finest qualities are imported from France.

tages, are united of the combination of the gold with the copper, and of an almost unlimited thickness of gold. (Comptes Rendus, July, 1843.)

The decomposition cell should be made of *glass* or *porcelain*, and preferably of the former, because it admits more easily of the inspection of the process. It should also, for economy's sake, be of such a form as to permit the objects to be gilded, to be covered with the smallest possible quantity of the solution of gold. In reference to the battery it may be remarked, that the feebler and more constant its action, the greater is the solidity of the gilding, and its degree of adhesion to the gilded surface. In many cases, however, comparatively powerful electro-currents are employed, for the sake of expedition; but the process thereby becomes more difficult to manage with success. (See ELECTROTYPE, &c.)

GILDING, WASH. *Syn.* WATER GILDING. MERCURIAL DO. AMALGAM DO. This consists in the application of a thin coating of amalgam of gold to the metallic surface to be gilded, and in the volatilization of the mercury by heat. It is the usual method of gilding articles of copper and its alloys, and possesses great beauty and durability, when properly executed. The process consists of several operations; viz.—

1. (*The amalgam.*) Put 1 part of fine gold into an iron crucible, apply heat, and when faintly red add 8 parts of mercury, agitate with an iron rod, and when the whole of the gold is dissolved, pour it (cautiously) into an earthen vessel, containing water. The amalgam must be next squeezed in chamois leather to separate the running mercury, and the latter must be preserved for a future operation, as it contains a portion of gold. The solid or semi-solid amalgam is then preserved for use.

2. (*The mercurial solution.*) Dissolve 10 parts of mercury in 11 parts of aquafortis, (sp. gr. 1·33,) and dilute the solution with 25 times its weight of water.

3. (*Annealing.*) The article of bronze, copper, or brass is prepared by setting it among burning charcoal or peat, observing to heat it equally until it acquires a cherry red color in the dark, when it is allowed to cool slowly in the air.

4. (*The decapage or scouring.*) The article is next soaked in water, strongly soured with oil of vitriol, and to which a little salt has been added, until the film of oxide is dissolved off or loosened; it is then rubbed bright with a stiff brush, washed in clear water, and rubbed dry with clean sawdust or bran, when a very smooth dull surface is obtained, if the process has been well conducted.

5. (*Application of the amalgam.*) A fine brass wire brush (*scratch-brush*) is now dipped into the mercurial solution, next drawn slopingly over a lump of amalgam of gold, and then over the surface of the article to be gilded, and this process is repeated until a sufficient coating of the amalgam has been thus given to the alloy.

6. (*The firing.*) The article is now gradually heated by exposing it to burning charcoal, during which time it is kept turning about to distribute the heat equally. When the amalgam is properly fused on the surface, the piece is withdrawn from the fire and rapidly brushed and rubbed over in every direction with a stiff long-haired brush, to equalize the surface; it is then again slowly heated as before, until the whole of the mercury is volatilized. During this time should any defects be observed in the gilding, it is repaired by additional applications of the amalgam to such parts, without removing the piece from the fire. When the whole of the mercury is driven off, the piece is washed in vinegar and water, and then in pure water.

7. (*Epargner.*) The parts of the piece that are to be burnished are *protected* with a mixture of Spanish white, sugar-candy, and gum, mixed up with water; it is next dried and heated to expel any remaining particles of mercury, and then plunged while hot into water, acidulated with sulphuric acid, washed, and dried.

8. (*Burnishing.*) This is done with burnishers of bloodstone or hematite, dipped into vinegar and water, and skilfully rubbed backwards and forwards, until a sufficient polish is produced. The piece is then washed in pure water, wiped with soft linen, and dried over a chafing-dish of charcoal.

9. (*Deadening.*) The parts to be burnished are covered or protected as above, and then heated until the protection becomes partially carbonized and brown; the remaining surface is then covered over with a mixture of alum, salt, and nitre, and the piece is again heated until the latter mixture runs and becomes glassy; it is then withdrawn, plunged into water, and the coating cleaned off; it is next washed in very weak nitric acid, then in pure water, and lastly wiped, and dried in a stove.

10. (*Coloring.*) *a.* (*Red gold color.*) The article to be gilded, after being coated with the amalgam, as in the 5th operation, is to be gently heated, and while hot, covered with *gilder's wax;* it is then "flamed" over a wood fire and strongly heated, during all which time it is kept in a state of continual motion, to equalize the action of the fire on the surface. When all the composition has burned away the piece is plunged into water, next cleaned with the scratch-brush and vinegar, and then washed and burnished. To bring up the beauty of the color, the piece is sometimes washed with a strong solution of verdigris in vinegar, next gently heated, plunged while hot into water, and then washed, first in vinegar, or water soured with nitric acid, and then in pure water; it is lastly burnished, and again washed and dried.—*b.* (*Or molu color.*) This is given by covering the parts with a mixture of powdered hematite, alum, common salt, and vinegar, and applying heat until the coating blackens, when the piece is plunged into cold water, rubbed with a brush dipped in vinegar, or water strongly soured with nitric acid, again washed in pure water, and dried. During this process the parts not to be in "or molu color" should be protected.

Remarks. Great care should be taken by the workmen at mercurial gilding to avoid the fumes, as they exercise a most pernicious effect upon the health. By the adoption of the furnace invented by M. D'Arcet this evil is obviated, as the whole of the volatilized mercury is carried off, and again condensed for further use. In this way the occupation of the water-gilder is rendered as healthy as most other trades. It is to be regretted, however, that owing to the prejudices of the workmen against these furnaces, and the indifference of the

[Proof.]

As the vine, which has long twined its gracǝful foliage about the oak / and been lifted by it into sunshine, will when the hardy plant is rift ed by the thunder bolt, cling round it with its *caressing* tendrils, and bind its shattered boughs up so is it ordered beautifully by providence, that woman, who is the mere dependant and ornament of man in ~~the~~ happier hours, should his stay and solace.

When smitten by sudden calamity / winding herself into the rugged recesses of his nature, tenderly supporting the drooping ~~head~~, and binding up the broken heart. [It also is interesting to notice how *some* MINDS seem almost to create themselves, springing up under, and working their solitary but irresistible way, through a thousand obstacles / Nature seems, &c.

IRWING.

29 every disadvantage

The same corrected:

As the *vine*, which has long twined its graceful foliage about the oak, and been lifted by it into sunshine, will, when the hardy plant is rifted by the thunderbolt, cling round it with its caressing tendrils, and bind up its shattered boughs, so is it beautifully ordered by Providence, that WOMAN, who is the mere dependant and ornament of man in his happier hours, should be his stay and solace when smitten by sudden calamity; winding herself into the rugged recesses of his nature, tenderly supporting the drooping head, and binding up the broken heart.

It also is interesting to notice how *some* minds seem almost to create THEMSELVES, springing up under every disadvantage, and working their "solitary but irresistible way," through a thousand obstacles. Nature seems, &c

IRVING.

Explanation of the marks.

1. When a letter or word is to be in *italics*.
2. When a letter is turned upside down.
3. The substitution of a comma for another point or letter.
4. The insertion of a hyphen; also marked -/
5. When letters should be close together.
6. When a letter or word is to be omitted.
7. When a word is to be changed to Roman.
8, 9. Two methods of marking a transposition; when there are *several* words to be transposed, and they are much intermixed, it is a common plan to number them, and to put the usual mark in the margin.
10. Substitution of a capital for a small letter.
11. When a word is to be changed from small letters to capitals.
12. The transposition of letters in a word.
13. The substitution of one word for another.
14. When a word or letter is to be inserted.
15. When a paragraph occurs improperly.
16. The insertion of a semicolon.
17. When a space or quadrat stands up, and is seen along with the type.
18. When letters of a wrong fount are used.
19. When words crossed off are to remain.
20. The mark for a paragraph, when its commencement has been neglected. Sometimes the sign [, or ¶, or the word "*break*," is used, instead of the syllables "*New Par.*"
21. For the insertion of a space when omitted.
22. To change capitals to small letters.
23. To change small letters to small capitals.
24. When lines or words are not straight.
25, 26. The insertion of inverted commas. The apostrophe is similarly marked.
27. The insertion of a period when omitted, or in place of another point or letter.
28. Substitution of one letter for another.
29. The method of marking an omission or insertion when too long for the side margin.

CORROSION, PREVENTION OF. The best means of preventing the corrosion of metals is first to dip the articles into very dilute nitric acid, and afterwards to immerse them in linseed oil, allowing the superfluity of oil to drain off; they are by this means very effectively preserved from rust or oxidation. (W. J. Lander.)

COSMETICS. (*Cosmetica*, from Κοσμέω, *I adorn.*) Any external application used for the purpose of preserving or restoring the beauty. The term is generally understood to refer to substances applied to the cuticle, to improve the color and clearness of the complexion; but some writers have included under this head, every topical application to promote the personal appearance. Hence cosmetics may be divided into three kinds, viz.:—*Cutaneous cosmetics*, or those applied to the skin; *hair cosmetics*, or such as are employed to promote the growth and beauty of the hair; and *teeth cosmetics*, or such as are used to cleanse and beautify the teeth. The present article will be confined to a short notice of the first of these divisions, referring the reader to the separate heads —*hair dyes, pomatums, pommades, depilatories, dentifrices, tooth powders, &c.*, for information respecting the remainder.

CUTANEOUS COSMETICS. The most simple and universally employed cosmetics are soap and water, which at once cleanse and soften the skin. Soap containing a full proportion of alkali, exercises a solvent power upon the cuticle, a minute portion of which it dissolves; but when it contains a small preponderance of oily matter, as the principal part of the milder toilet soaps now do, it mechanically softens the skin and promotes its smoothness. Almond, Naples, and Castile soaps are esteemed for these properties, and milk of roses, cold cream, and almond powder, (paste,) are used for a similar purpose. To produce an opposite effect, and to harden the cuticle, spirits, astringents, acids, and astringent salts are commonly employed. The frequent use of hard water has a similar effect. The application of these articles is generally for the purpose of strengthening or preserving any given part against the action of cold, moisture, &c.; as the lips, or mammæ, from chapping, or the hands from contracting chilblains; but in this respect, oils, pommades, and other oleaginous bodies, are preferable.

Another class of cutaneous cosmetics are employed to remove freckles and eruptions. Among the most innocent and valuable of these, is Gowland's lotion, which has long been a popular article, and deservedly so, for it not only tends to impart a delightful softness to the skin, but is a most valuable remedy for many obstinate eruptive diseases, which frequently resist the usual methods of treatment. Bitter almonds have been recommended to remove freckles, (Celsus,) but moistening them with a lotion made by mixing 1 oz. of rectified spirit of wine, and a teaspoonful of muriatic acid, with 7 or 8 oz. of water, is said to do this more effectually. A safe and excellent cosmetic is, an infusion of horseradish in cold milk. (Withering.)

Skin paints and stains are employed to give an artificial bloom, or delicacy to the skin. Rouge and carmine are the articles most generally used to communicate a red color. The former is the only cosmetic that can be employed, without i jury, to brighten a lady's complexion. The latt though possessing unrivalled beauty, is apt to i part a *sallowness* to the skin by frequent u Starch powder is employed to impart a white t and is perfectly harmless. The American ladi who are very fond of painting their necks whi use finely-powdered magnesia, which is anoth very innocent substance. Several metallic co pounds, as trisnitrate, subchloride, and oxide bismuth, (pearl white, Fard's white, &c.,) carb nate of lead, (flake white,) white precipitate, & are frequently used to revive faded complexion but they are not only injurious to the skin, but a aspoisons, if taken up by the absorbents. Tr nitrate of bismuth, (pearl white,) probably t least injurious of these articles, has caused sp modic tremblings of the muscles of the face, en ing in paralysis. (Vogt. Pharm.) The employme of liquid preparations, containing sugar of le which are commonly sold under the name of mi of roses, cream of roses, &c., is equally injurio Another disadvantage of these white metal preparations is, that they readily turn black, wh exposed, to the action of sulphureted hydrog gas, or the vapors of sulphur, which frequent escape into the apartment from coal fires. Th are many instances recorded, of a whole compa being suddenly alarmed, by the pearly complexi of one of its belles being suddenly transform into a sickly gray or black. A friend of the w ter's was once startled at a Christmas party observing the one side of a lady's face and nec which was exposed to the fire, become discolo in this way, and was so amused on learning t cause, that he has since played two or three jo of the kind on some petulant old ladies, remai able for the great attention they pay to their t let. In conclusion it may be remarked, that t best *purifiers of the skin* are soap and wat followed by the use of a *coarse* cloth, in oppo tion to the *costly* and *soft diapers* that are co monly employed; and the best *beautifiers*, HEALTH, EXERCISE, and GOOD TEMPER.

COSMETIC, SIMPLE. *Prep.* Soft soa lb.; melt over a slow fire with a gill of sweet add half a teacupful of fine sand, and stir t mixture together until cold. The shelly sea-sa sifted from the shells, has been found better th that which has no shells.

Remarks. This simple cosmetic has, for seve years past, been used by many ladies who are markable for the delicate softness and whitea of their hands, which they, in a great measu attribute to the use of it. Its cheapness is a str recommendation.

COUGH. The sudden and violent expuls of air from the lungs. It is generally symp matic of other affections, but is sometimes idio thic. Many cases of cough depend upon the tension of catarrh to the trachea and bronch which thus become loaded with mucus or phleg which they endeavor to throw off by the conv sive effort called coughing. In some cases i caused by a vitiation and inspissation of the sec tions, arising from the imperfect action of the sorbents; this is the common cause of the cough of old people. Idiopathic cough is not co sidered dangerous in itself, or while running

regular course, but it is often productive of most serious consequences, by superinducing the inflammation of some organ, or laying the foundation of phthisis.

Cough is sometimes attended by copious expectoration, and at other times exists without any; it has hence been distinguished into *moist* or *mucous* cough, and *dry* cough.

Treat. The treatment of common catarrhal cough consists in allaying the irritation as much as possible, by demulcents and expectorants, as mucilaginous drinks and lozenges, which act upon the glottis, and sympathetically upon the trachea and bronchiæ. Among the first may be mentioned, almond milk, barley water, refined Spanish juice, gum arabic, and a mixture of the last two made into lozenges; among the second, the most innocent and convenient is ipecacuanha, in the shape of lozenges, 2 or 3 of which may be sucked whenever the cough is troublesome. A light diet should be adopted, the bowels kept *slightly* relaxed by mild aperients, and a mild and equable temperature sought as much as possible. When this plan does not succeed, recourse may be had to an emetic, followed by small doses of Dover's powders, and extract or tincture of henbane, or squill pill. When a cough is troublesome at night, and unattended with fever, a small dose of laudanum, or tincture of henbane, taken on going to rest, will generally procure sleep. In the treatment of dry cough the more stimulating expectorants are useful, as garlic, ammoniacum, styrac, and benzoin, combined with narcotics and sedatives, as henbane, hemlock, and opium. A diaphoretic opiate is also very useful, especially in the cough of old people.

COUGH, POPULAR REMEDIES FOR. I. (*Draughts.*) *a.* Sirup of poppies 1 dessert-spoonful; antimonial wine 20 drops; mix for a dose, to be taken in a little warm tea on going to bed. *b.* Laudanum 30 drops; vinegar and honey, of each, a dessert-spoonful; ipecacuanha wine 25 drops; mix for one dose, as last.

II. (*Emulsion.*) Milk of almonds 4 oz.; sirup of squills and tolu, of each, 1 oz.; mix. *Dose.* A tablespoonful every 2 hours.

III. (*Mixtures.*) *a.* Tincture of tolu ½ oz.; paregoric elixir and tincture of squills, of each, ½ oz.; sirup of white poppies 1 oz.; mix. *Dose.* 1 teaspoonful in barley water, whenever the cough is troublesome. *b.* Milk of ammoniacum 4 oz.; sirup of squills 2 oz.; mix. A tablespoonful 3 or 4 times daily, for the cough of old persons. *c.* (*Dr. Munro's.*) Paregoric ½ oz.; sulphuric ether and tincture of tolu, of each, ¼ oz.; mix. *Dose.* A teaspoonful night and morning, or when the cough is troublesome, in a little warm water. *d.* (*Dr. Radcliff's.*) Sirup of poppies, sirup of squills, and paregoric, of each, ½ oz.; mix. *Dose.* As last.

COUMARINE. The fragrant volatile principle of the tonka bean, the diptera odorata of Wildenow. It is dissolved out by ether, and purified by alcohol. It crystalizes in small prisms.

COWHAGE. *Syn.* COWITCH. DOLICHI PUBES. The down which grows upon the pods of the mucuna pruriens. (Dolichos pruriens.) It occasions violent itching, when it comes in contact with the skin, which can only be allayed by a solution of given vitriol or oil. It is frequently administered as a vermifuge, made into a confection, by scraping the hair off a pod into treacle, sirup, or honey, for a morning dose, which is repeated for 3 or 4 successive days, followed by a brisk purge.

COWS, MILCH, (CHOICE OF.) As to a choice of breeds for a private family, none in England, (says Mr. Lawrence,) probably combine so many advantages as the Suffolk dun-cows. They excel both in quantity and quality of milk; they feed well after they become barren; they are small-sized, and polled or hornless; the last a great convenience. The horns of cows which butt and gore others, should be immediately broad tipped. There is a breed of polled Yorkshire, or Holderness cows, some of them of middling size, great milkers, and well adapted to the use of families, where a great quantity of milk is required, and where price is no object, and food in plenty. If richer milk and a comparison of the two famous breeds be desired, one of each may be selected, namely, the last mentioned, and the other of the midland county, or long-horned species. Color is so far no object, that neither a good cow nor a good horse can be of a bad color; nevertheless, in an ornamental view, the sheeted and pied stock of the Yorkshire shorthorns make a picturesque figure in the grounds.

The Alderney cows yield rich milk upon less food than larger stock, but are seldom large milkers, and are particularly scanty of produce in the winter season. They are, besides, worth little or nothing as barreners, not only on account of their small size, but their inaptitude to take on fat, and the ordinary quality of their beef.

Feeding. There is nothing equal to rich pasturage for milch cows, but at such seasons, and during such weather that this cannot be procured, good hay, with turnips, carrots, potatoes, or mangel-wurzel, must be given instead, along with a sufficient quantity of clean water. The principal cowkeepers of the metropolis have dairy-farms in the suburbs, where the animals are turned out a portion of every day in the year, except during heavy rains, or when the ground is covered with snow. They are also well supplied with brewers' grains, tares, beet-root, &c., and great care is taken that they get fresh air, and exercise sufficient for their health. Such cows yield a large quantity of wholesome milk, very different to much that is sold in London, obtained from cows kept in stables, cellars, and other confined situations, and which are seldom supplied with green food. It has lately been shown by Boussingault, that mangel-wurzel, so commonly used for feeding cattle, is insufficient as an article of food. He found that a cow fed on this substance ceases to give her usual quantity of milk, and that even when other food was given along with it, the animal yielded less than her ordinary quantity. Before giving turnips to cows, the rotten or bad ones should be picked out, as it is said that even the presence of a single damaged one will flavor the milk, and perhaps spoil a whole dairy of cheese or butter.

Economy of a cow. The annual consumption of food per cow, if turned to grass, is from an acre to an acre and a half in the summer, and from a ton to a ton and a half of hay in the winter. A cow may be allowed 2 pecks of carrots

perceive any good effects to result from its administration.

COPAIBIC ACID. *Syn.* CAPIVIC ACID. The yellow brittle resin of balsam of copaiba. It is prepared by digesting the resin (left after distilling the oil from the balsam) in alcohol, which dissolves the acid resin, but leaves the viscid one. It may be purified by re-solution in alcohol. It forms about 50§ of the balsam.

Prop. An amber-colored, brittle, semi-crystalline, resinous substance, soluble in alcohol, ether, and oils, reddens litmus paper, and forms salts with the bases, called copaivates. These may generally be made by dropping into a solution of the acid in alcohol, an alcoholic solution of a soluble salt of the base. The copaivates of potash, soda, and ammonia are easily prepared, by adding to an alcoholic solution of the acid another of the pure alkali, until it be neutralized, when the salts may be obtained by careful evaporation. Copaivate of silver is formed by neutralizing the acid with nitrate of silver, both being dissolved in alcohol, and then adding a little liquor of ammonia, when a white crystalline precipitate will subside. The copaivates of lead, lime, and iron, as well as several others, may be made in a similar manner.

Copaivate of magnesia may be made by adding copaivate of potassa to a solution of epsom salts. All these salts are easily decomposed by acids.

COPAL. *Syn.* GUM COPAL. A resinous substance, which exudes spontaneously from the Rhus copallinum, and the Elæocarpus copalifer. When of good quality, it is too hard to be scratched by the nail, and has a conchoidal fracture. It dissolves with difficulty, and this, combined with its extreme hardness, renders it very valuable for making varnishes.

SOLVENTS. I. *Caoutchoucine;* sparingly. II. Equal parts of *caoutchoucine* and *alcohol,* of ·825; freely soluble in the cold. III. *Absolute alcohol,* added gradually to the copal, previously rendered gelatinous by water of ammonia, assisting the union with heat. IV. *Alcohol* added to the copal, previously softened with ether. V. *Absolute alcohol* 1½ parts, digested on copal 1 part for 24 hours. (Unverdorben.) VI. *Alcohol,* to which a little camphor has been added. VII. *Ether;* and this solution may be diluted with alcohol. VIII. *Oils of rosemary* and *lavender,* (spike;) too expensive for general use. IX. *Copal,* heated until it fuses, acquires the property of dissolving in turpentine and alcohol. X. *Copal,* reduced to powder and exposed for some time to the air, also becomes soluble in alcohol and turpentine. XI. *Drying linseed oil,* at nearly the boiling point, dissolves copal, and will bear dilution with spirits of turpentine as soon as it has cooled sufficiently. This is the common way of making copal varnish. XII. *Ammonia* enables oil of turpentine to dissolve copal; but it requires such nice management of the fire, that it seldom succeeds completely. (Lewis.) XIII. *Powdered copal,* triturated with a little camphor, softens and becomes a coherent mass; and camphor, added either to alcohol or oil of turpentine, renders it a solvent of copal. ½ oz. of camphor is sufficient for 1 quart of oil of turpentine, which should be of the best quality; and the copal, about the size of a large walnut, should be broken into very small pieces, but not reduced to a fine powder. The mixture should be set on a fire so brisk as to make it boil almost immediately The vessel should be of tin or other metal, strong, shaped like a wine-bottle with a long neck, and capable of holding 2 quarts. The mouth should be stopped with a cork, in which a notch is cut to prevent the vessel from bursting. (Sheldrake.) XIV. A good varnish may be made by pouring upon the purest lumps of copal, reduced to a fine mass in a mortar, colorless spirits of turpentine, to about one third higher than the copal, and triturating the mixture occasionally in the course of the day. Next morning it may be poured off into a bottle for use. Successive portions of oil of turpentine may thus be worked with the same copal mass. (Varley, Tilloch's Mag. 51.)

*** In all the above cases the copal should be reduced to a *coarse* powder. A *fine* powder is apt to stick together and form hard lumps. The solution of copal, even in its most ready solvents, is attended with some difficulty, and frequently miscarries in the hands of the inexperienced. A mixture of caoutchoucine and alcohol (as in No. II.) is an exception.

COPAL, MELTED. Obtained by holding the gum before a good fire, so that as soon as the copal melts, it may drop into a pan of water: a kind of oil separates from it, and the copal becomes soluble in spirits of wine, and still more so if the melting is repeated.

COPAL, POWDERED. Copal reduced to powder and exposed to the air in a thin stratum, on sieves covered with paper, for 3 or 4 months. Soluble in alcohol.

COPPER. (From *cuprum,* a corruption of *κύπρος*, from the island of Cyprus, whence it was formerly brought.) A red-colored metal, too well known to require description.

Hist. Copper and its alloys appear to have been known to the most remote ages of antiquity. Brass, an alloy of copper, is mentioned by Moses (Job, xxviii.) upwards of 1600 years before the birth of Christ. (Hales.) This metal is found in the metallic state, and in combination with oxygen, sulphur, acids, and other minerals, and in the organic kingdom, in the ashes of plants, and in the blood of animals. (Sarzeau.) The copper of commerce is principally prepared from copper pyrites, a mixed sulphuret of iron and copper, found in Cornwall, and other parts of the world.

Prep. Copper is only prepared from its ores on the large scale. The copper pyrites is first roasted, and then smelted, by which process "*coarse metal*" is produced; this is again submitted to calcination and smelting, when "*fine metal*" is obtained. It afterwards undergoes the process of refining and toughening.

Prop. This metal is malleable and ductile. It has a specific gravity of 8·8 to 8·9, fuses at about 2000° Fahr., and volatilizes at higher temperatures. It forms numerous compounds, all of which are more or less poisonous.

Char. and Tests. The solutions of copper possess a blue or green color, and yield a blue precipitate with soda or potassa. Ammonia produces a bluish-white precipitate, soluble in an excess of the precipitant, forming a deep blue solution. Prussiate of potash gives a reddish-brown precipitate, sulphureted hydrogen and hydrosulphurets, a black

ie. A polished iron plate, immersed in an acidulous solution of copper, becomes coated with that metal.

Estim. The quantity of copper present in any compound, may be estimated by throwing it down from its solution by pure potassa, after which it must be carefully collected, washed, dried, ignited, and weighed. This will give the quantity of the oxide from which its equivalent of metallic copper may be calculated; every 5 parts of the former being (as near as possible) equal to 4 of the latter. Copper may also be precipitated at once in the metallic state, by immersing a piece of polished steel into the solution, but this method will not give very accurate results. Copper may be separated from lead by adding sulphuric acid to the nitric solution, and evaporating to dryness, when water digested on the residuum will dissolve out the sulphate of copper, but leave the sulphate of lead behind. From this solution the oxide of copper may be thrown down as before. Copper may be separated from zinc by sulphureted hydrogen, which will throw down a sulphuret of copper, which may be dissolved in nitric acid, and treated as above.

Uses. The applications of copper in the arts are too well known to require notice. In medicine, 3 or 4 grains of the filings were formerly given in rheumatism, and to prevent hydrophobia.

Ant. Copper in the metallic state appears to be inert, but most of its compounds are poisonous. The antidotes are, the white of egg, milk, or flour mixed with water. Iron filings (Payen, Chevallier, Dumas) and the prussiate of potash have also been recommended. A drachm or more of the latter may be taken dissolved in water, and ½ oz. or more of the former, ad libitum. Sugar has also been proposed as an antidote. (Duval, Postel.)

COPPER, ALLOYS OF. With *zinc* copper forms *brass*; with *tin*, *bronze*, *bell*, and *cannon metal*. An alloy made with 100 parts of copper and 50 of tin, forms *speculum metal*. *White copper* is formed by the addition of metallic arsenic, and *German silver* is a mixture of nickel, zinc, and copper. See these articles in their alphabetical places.

COPPER, ACETATES OF. I. (*Neutral Acetate. Syn. Distilled Verdigris. Binacetate of Copper. Crystallized Verdigris.*) *Prep.* Dissolve verdigris in vinegar, with the aid of heat, and crystallize. It forms dark green or blue crystals.

II. (*Diacetate. Syn. Verdigris. Ærugo.*) Formed by exposing sheets of copper to the vapor of acetic acid, in a warm situation. (See VERDIGRIS.) It forms a green or bluish-green powder.

III. (*Sesquibasic Acetate.*) The blue portion of verdigris, soluble in water.

IV. (*Trisacetate.*) The green insoluble portion of verdigris.

COPPER, ARSENITE OF. *Syn.* SCHEELE'S GREEN. *Prep.* Mix a solution of 2 parts of sulphate of copper in 44 of water, with a solution of 2 parts of potash of commerce, and 1 of pulverized arsenious acid, also in 44 of water. Both solutions being warm, the first is to be gradually poured into the second. The grass-green insoluble precipitate is to be washed with water.

COPPER, AMMONIURETED. *Syn.* CUPRO-SULPHATE OF AMMONIA. AMMONIATED COPPER, (P. E.) *Prep.* (*Ammonio-sulphate of Copper,* P. L.) Sulphate of copper ℥j; sesquicarbonate of ammonia ℥iss. Rub them together until carbonic acid ceases to evolve, then wrap it up in bibulous paper and dry it in the air.

Prop. By heat ammonia is evolved, and oxide of copper remains. Its aqueous solution changes the color of turmeric, and a solution of arsenious acid renders it green. (P. L.)

Uses. Employed in pyrotechny. It has been given in doses of ½ to 5 grs. in chorea, epilepsy, hysteria, &c., but it is principally employed as an injection and as a collyrium, in opacity of the cornea.

Remarks. Great care must be taken in drying this article, as it is apt not only to lose a large portion of its weight, but become of an inferior color. Both the ingredients should be separately reduced to powder before mixing.

COPPER, BEAN-SHOT. *Prep.* Melt copper, and pour it in a small stream into boiling water. It is in small lumps like peas or beans, hence its name.

COPPER, BLANCHED. *Prep.* Fuse copper with $\frac{1}{18}$ of its weight of neutral arsenical salt, under a flux of calcined borax, charcoal, and powdered glass.

COPPER, CARBONATE OF. *Syn.* DICARBONATE OF COPPER. MINERAL GREEN. *Prep.* Add a solution of carbonate of soda or potassa to a hot solution of protosulphate of copper.

Remarks. The beautiful green mineral called *malachite*, is a hydrated dicarbonate of copper. If the solution of copper in the above formula be employed cold, the precipitate has a bluish-green color. (See VERDITER.)

COPPER, CHLORIDES OF. *Prep.* I. (*Subchloride. Syn. Dichloride of Copper. Resin of ditto. White muriate of ditto.*) Distil a mixture of 1 part of copper filings, with two parts of corrosive sublimate.

II. (*Chloride. Syn. Muriate of Copper. Hydrochlorate of ditto. Protochloride of ditto.*) Dissolve protoxide of copper in muriatic acid, evaporate and crystallize.

Remarks. This salt forms green needles, is deliquescent, soluble in alcohol, and when heated, (under 400°,) loses its water, and becomes anhydrous chloride of copper, and assumes the form of a yellow powder. The first of these preparations is sometimes called the protochloride or muriate; the second the deutochloride.

COPPER, CHROMATE OF. *Prep.* Precipitate a salt of copper, with neutral chromate of potash; or dissolve hydrated peroxide or carbonate of copper in chromic acid. Caustic ammonia dissolves this salt, forming a magnificent dark-green liquid, from which, by the admixture of spirit of wine, ammonio-chromate of copper, or cupro-chromate of ammonia, is disengaged in the form of a powder of a splendid, rather dark-green appearance. The readiest way of preparing this permanent and beautiful color, is to add solution of chromate of potash to ammoniacal sulphate of copper.

COPPER, FEATHER-SHOT. *Prep.* Melted copper, poured in a small stream into cold water. It forms small pieces, with a feathered edge, hence the name. It is used to make solution of copper.

sale druggist in the city, produces an excellent article.

II. Hay saffron, cassia, and turmeric, of each 4 oz.; cardamoms 1 oz.; starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oil of nutmegs 2 drachms; oil of cloves 3 drachms. Reduce the dry ingredients to fine powder, and pass it through an 80 hole sieve, then add the oils, and after well mixing, pass it through a coarse sieve, (about 40 holes to the inch,) to ensure the whole being perfectly mixed.

The following form produces a powder possessing great depth and brilliancy of color.

III. Hay saffron 4 oz.; turmeric 3 oz.; powdered starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oils of cloves and cassia, of each 3 drachms; oil of nutmegs 2 drachms; essence of cardamoms 1 oz. *Proc.* Boil the saffron and turmeric in 1 gallon of water, placed in a bright copper pan, for 10 minutes, then, without straining, add the chalk, starch, and sugar; mix well, and continue stirring until the mixture becomes quite stiff, then break it up and dry it until fit for powdering. This must be performed in a water or steam bath. To the powder, passed through a fine sieve, as before, the oils and tincture must be added, and after being well mixed, and passed through a coarse sieve, it should be placed in a jar or bottle, and bunged up close.

Remarks. In the wholesale trade this article is kept under two forms: one in powder, as ordered by the College, and commonly called, for distinction sake, "*pulvis confectionis aromaticæ;*" the other mixed up ready for use. In preparing the latter, it is a common plan to make a strong infusion or decoction of the saffron, and to use it to mix up the other ingredients. Some persons follow the method described in the last formula, mixing up the powder to a proper consistence with water before adding the aromatics. When the price of *precipitated* chalk is an objection to its use, *prepared* chalk may be used instead. This confection is cordial, stimulant, and antacid. *Dose.* 10 to 60 grs.

CONFECTION OF BLACK PEPPER. *Syn.* WARD'S PASTE. *Prep.* (*Confectio Piperis Nigri*, P. L.) Black pepper and elecampane root, of each lb. j; fennel seed lb. iij; honey and white sugar, of each lb. ij; mix.

Remarks. The common practice is to keep the dry ingredients ready mixed in a bottle, and only to add the honey as wanted. The proportions are 2 parts of the latter to 7 of the mixture. The *dose* is 1 to 2 drachms 2 or 3 times a-day, in piles, fistula, &c. It should be persevered in for 2, 3, or 4 months, (Sir B. Brodie;) and as it is apt to accumulate in the bowels, its use should be accompanied by mild aperients. (Pereira.)

CONFECTIONS OF CASSIA. *Syn.* ELECTUARIUM CASSIÆ, (P. L. 1788.) *Prep.* (*Confectio Cassia*, P. L.) Fresh cassia pulp lb. ss.; manna ℥ij; tamarind pulp ℥j; sirup of roses f℥viij. Bruise the manna and dissolve it in the sirup, then add the pulps and evaporate to a proper consistence.

CONFECTION OF HEMLOCK. (Dr. Osborne.) *Prep.* Fresh leaves of hemlock and moist sugar equal parts; beat them to a confection in a mortar.

CONFECTION OF OPIUM. *Syn.* PHILONIUM ROMANUM, (P. L. 1720.) DITTO LONDINENSE, (P. L. 1745.) CONFECTIO OPIATA, (P. L. 1788.) DITTO OPII, (P. L. 1809, and since.) *Prep.* (P. L.) Powdered opium ʒvj; long pepper ℥j; ginger ℥ij; caraways ℥iij; tragacanth ʒij; all in fine powder; sirup f℥xvj. Mix.

Use and Dose. This confection is intended as a substitute for the *mithridate* and *theriaca* of the old Pharmacopœia. It is stimulant and narcotic, and is given in flatulent colic and diarrhœa unaccompanied by fever. The dose is from 15 to 50 grs.

CONFECTION OF ORANGE PEEL. *Syn.* CONSERVA FLAVEDINIS CORTICUM AURANTIORUM, (P. L. 1720 and 1745.) DITTO CORTICIS EXTERIORIS AURANTII HISPALENSIS, (P. L. 1788.) DITTO AURANTIORUM, (P. L. 1824.) DITTO AURANTII, (P. L. 1809 and 1836.) *Prep.* (P. L.) The external rind of the fresh orange, separated by rasping, lb. j; white sugar lb. iij. Beat the rind in a stone mortar with a wooden pestle, then add the powdered sugar, and beat the mixture until the two are perfectly incorporated.

Remarks. This confection is tonic and stomachic, and is principally used as a vehicle for the exhibition of tonic powders.

CONFECTION OF PEPPERMINT. *Prep.* Green peppermint 4 oz.; powdered white sugar 12 oz.; beat them together as last.

Use. Anti-emetic and flatulent. Given in colic, &c., in the form of a bolus, or made into a mixture.

CONFECTION OF THE DOG ROSE. *Syn.* CONFECTION OF HIPS. CONSERVA FRUCTUS CYNOSBATI, (P. L. 1720 and 1745.) DITTO CYNOSBATI, (P. L. 1788.) DITTO ROSÆ CANINÆ, (P. L. 1809, and since.) *Prep.* (P. L.) Pulp of the dog rose lb. j; powdered refined sugar ℥xx; mix by a gentle heat in an earthen vessel.

II. Pulped hips 2 cwt.; fine white sugar 2½ cwt.; incorporate them without applying heat.

Remarks. Both this and the following confection has a brighter color, if made without heat, or touching metallic vessels. On the small scale it is made by beating the ingredients together in a marble mortar, but in large quantities by grinding in a mill. It is slightly laxative, and is principally used for forming pills. It candies by keeping.

CONFECTION OF THE RED ROSE. *Syn.* CONSERVA ROSARUM RUBRARUM, (P. L. 1745.) DITTO ROSÆ, (P. L. 1788.) DITTO ROSÆ GALLICÆ, (P. L. 1809 and 1824.) CONFECTIO ROSÆ GALLICÆ, (P. L. 1836.) *Prep.* (P. L.) Petals of the red rose lb. j; refined sugar lb. iij; beat the petals in a stone mortar, then add the sugar, and again beat until thoroughly incorporated.

Remarks. On the large scale this is prepared like the confection of hips. It is astringent and tonic, and principally used for forming pills. If taken alone, the dose is 1 to 2 drachms.

CONFECTION OF RUE. *Syn.* ELECTUARIUM E BOCCIS LAURI, (P. L. 1720, 1745.) CONFECTIO RUTÆ, (P. L. 1809, and since.) *Prep.* (P. L.) Dried rue, caraway, and laurel berries, of each ℥iss; sagapenum (true) ℥ss; black pepper ʒij; honey ℥xvj. Reduce the dry ingredients to very fine powder, and when wanted for use, make them into a confection with the honey.

Use, &c. It is antispasmodic; in enemas 30 to

60 grs., with half a pint of gruel, for flatulent colic, &c.

CONFECTION OF SCAMMONY. *Syn.* ELECTUARIUM CARYOCOSTINUM, (P. L. 1720.) DITTO E SCAMMONIO, (P L. 1745.) DITTO SCAMMONII, (P. L. 1809 and 1788.) CONFECTIO SCAMMONEÆ, (P. L. 1809 and 1824.) *Prep.* (*Confectio Scammonii* P. L.) Scammony ℥iss; cloves and ginger, of each, ʒvj; oil of caraway fʒss. Reduce the ingredients to a very fine powder, and when wanted for use, make them into a confection with sirup of roses, and lastly add the oil.

Use, &c. Cathartic in doses of 10 to 30 grs.

CONFECTION OF SENNA. *Syn.* LENITIVE ELECTUARY. ELECTUARIUM SENNÆ, (P. L. 1788.) CONFECTIO SENNA, (P. L. 1809, and since.) *Prep.* (P. L.) Senna ℥viij; figs lb. j; pulp of tamarinds, prunes, and cassia, of each, lb. ss.; coriander seeds ℥iv; liquorice ℥iij; sugar lb. iiss; water 3 pints. *Proc.* Rub the senna and corianders in a mortar, and separate by sifting ℥x of the mixed powders. Boil the figs and liquorice in the water, until reduced to one half; then press and strain the liquor. Evaporate the strained liquor until only 24 fluid ounces remain, then add the sugar, and when dissolved, mix in the pulps, and lastly the powder.

Use, Dose, &c. Confection of senna is a gentle and pleasant purgative, and well adapted for persons suffering from piles, and as a laxative during pregnancy. The dose is ¼ to ½ oz. taken at bedtime or early in the morning.

Remarks. Perhaps there is no one pharmacopœial preparation which it is more difficult to obtain of good quality than the above. The absolute cost of an article prepared according to the directions of the College, will be somewhere about 1s. 9d. per lb.; but there are many wholesale drug houses vending confection of senna, which they warrant as genuine, at from 9*d.* to 1*s.* a pound. Dr. Paris (in his Pharmacologia) very truly remarks, that "the directions of the Pharmacopœia are very rarely followed." I understand that considerable quantities are manufactured, into which unsound and spoiled apples enter as a principal ingredient. The following forms are, to my knowledge, employed by some members of the trade.

II. Powdered senna, pulp of tamarinds, cassia, and prunes, of each, 1½ lb.; powdered corianders ¼ lb.; Spanish juice ½ lb.; simple sirup 12 lbs.

III. As the above, omitting the cassia pulp, and adding 2 lbs. more tamarind pulp.

Both these articles are labelled P. L., and sent out as genuine, and that when no competition as to price exists. The cheaper article is made as follows:

IV. Common prunes and tamarinds, of each, 16 lbs.; treacle ¾ cwt.; species (a compound of senna dust and small senna, mixed with 3 lbs. of coriander seeds, and strengthened with jalap, all ground to a fine powder) 18¼ lbs. To this is frequently added ¼ cwt. of rotten or inferior apples, which are pulped with the prunes and tamarinds. This article is not unfrequently labelled "CONF. SENNÆ VER." by the conscientious tradesman.

CONFECTION OF SULPHUR, (COMPOUND.) *Prep.* (St. B. H.) Precipitated sulphur ℥ss; cream of tartar ʒj; honey ℥j; mix As a laxative in piles, &c. *Dose.* ℥ss.

CONFECTION OF STEEL. *Syn.* CONFECTION OF CARBONATE OF IRON. *Prep.* Confection of orange-peel and sesquioxide of iron, (P. L.,) of each, 4 oz.; powdered white sugar 6 oz.; simple sirup 2 oz.; mix. Aromatic and tonic. *Dose.* A teaspoonful to ½ oz. twice or thrice daily.

CONGELATION, (from *congelo,* to freeze.) IN CHEMISTRY. The conversion of a liquid into a solid state, by the action of cold.

The production of an extreme degree of cold is often of the utmost importance in chemical operations, and an easy method of doing so is consequently a desideratum. The means hitherto adopted for this purpose have either depended upon the sudden liquefaction of solids, or the abstraction of heat by rapid evaporation. The loss of sensible heat, by the first method, is the basis of the various processes of producing cold by what are commonly called freezing mixtures, all of which act upon the principle of liquefying solid substances without supplying heat. The caloric of liquidity being in these cases derived from that previously existing in the solid itself in a sensible state, the temperature must necessarily fall. The degree of cold produced, depends upon the quantity of heat which is thus diffused through a larger mass, or which, as it were, disappears, and this is dependent on the quantity of solid matter liquefied, and the rapidity of the liquefaction. Saline compounds are the substances most frequently employed, and those which have the greatest affinity for water, and thus liquefy the most rapidly, produce the greatest degree of cold. Thus it is, that chloride of calcium and nitrate of ammonia, when dry and in fine powder, if suddenly mixed with water, produce extreme cold. The latter, suddenly mixed with an equal weight of water at 50°, will sink the thermometer to +4°, or 28° below the freezing point. The most common and convenient freezing mixture, when snow can be procured, is formed by mixing 2 parts of that substance with 1 part of sea-salt. This will sink the thermometer to —5°, or 37° below the freezing point of water. Equal parts of these substances produce a degree of cold marked by the zero of Fahrenheit's thermometer, and is the standard taken for graduating that instrument. Mr. Walker, a gentleman who fully investigated this subject, recommends the following proportions for the production of extreme cold.

peau. Bezetta Cœrulea. *Prep.* I. Color pieces of clean linen with auvergne or ground archel, (lichen parellus.)

II. Dip pieces of clean linen into the juice of mulberries, blood-red grapes, lees of red wine, &c.

Use. To color jellies and confectionary, and the rind of cheeses.

CLARIFICATION. This word (from *clarus*, clear, and *facio*, I make) means, properly, any process of freeing a fluid from heterogeneous matter, and thus includes filtration. In its commoner sense, however, it is applied to the process of clearing liquids by the addition of some substance that either inviscates the feculous matter, and subsides with it to the bottom, or, that induces such a change in its nature or bulk, that it subsides by its own density, in each case leaving the liquor transparent. Albanum, gelatin, acids, certain salts, blood, lime, plaster of Paris, alum, heat, alcohol, &c., serve in many cases for this purpose. The first is used under the form of white of egg, for the clarification of sirups, as it combines with the liquid when cold, but on the application of heat, rapidly coagulates and rises to the surface, carrying the impurities with it, forming a scum which is easily removed with a skimmer. It is also much used for fining wines and liqueurs, particularly the red wines and more limpid cordials. Gelatin, under the form of isinglass, dissolved in water, or weak vinegar, is used to fine white wines, beer, cider, and similar liquors, that contain a sufficient quantity of either spirit or astringency (tannin) to induce its precipitation. Sulphuric acid is frequently added to weak liquors for a similar purpose, either alone, or after the addition of white of egg, or gelatin, both of which it rapidly throws down in an insoluble form. A pernicious practice exists among some unprincipled parties, of using certain salts of lead and potash to clear their liquors, especially those that are expected to sparkle in the glass, as cordial, gin, &c. For this purpose, a little sugar of lead, dissolved in water, is first mixed up with the fluid, and afterwards about half its weight of sulphate of potash, also dissolved in water, is added, and the liquor is again roused up. By standing, the sulphate of lead, formed by this mixture, subsides, and leaves the liquor clear. Blood is used in the same way as isinglass or white of eggs, for fining red wines, beer, and porter. Lime, alum, alcohol, and heat, act by curdling or coagulating the feculencies, and thus, by increasing their density, induce their subsidence. Plaster of Paris acts partly like the above, and partly like albumine, or gelatin, by enveloping and forcing down the suspended matter. Sand is often sifted over liquors for the simple purpose of acting by its gravity, but appears to be quite useless. The juices of plants are clarified by heat, which coagulates the albumine they contain. Marl, or clay, is frequently used to clear cider and perry. A strip of isinglass is generally employed to clarify coffee. (See Wines, Brewing, Cordial, Coffee, Infusion.)

CLEANING. The best way to clean a house is to *keep it clean* by a daily attention to small things, and not allow it to get into such a state of dirtiness and disorder as to require great and periodical cleanings. Some mistresses, and also some servants, seem to have an idea that a house should undergo "regular cleanings," or great washing and scrubbing matches once every three or six months, on which occasions the house is turned almost inside out, and made most uncomfortable. All this is bad economy, and indicates general slovenliness of habits. (Chambers.)

CLEAR-STARCHING. This is practised as follows: "Rinse the articles in three waters, dry them, and dip them in a thick starch, previously strained through muslin; squeeze them, shake them gently, and again hang them up to dry; and when dry, dip them twice or thrice in clear water, squeeze them, spread them on a linen cloth, roll them up in it, and let them lie an hour before ironing them. Some persons put sugar into the starch to prevent it sticking while ironing, and others stir the starch with a candle to effect the same end; we object to these practices as injurious to the article starched, or as very nauseous. The best plan to prevent sticking is to make the starch well, and to have the irons quite clean and highly polished."

CLOTH, CLEANING AND SCOURING OF. The common method of cleaning cloth is by beating and brushing, unless when very dirty, when it undergoes the operation of scouring. This is best done on the small scale, as for articles of wearing apparel, &c., by dissolving a little curd soap in water, and, after mixing it with a little ox-gall, to touch over all the spots of grease, dirt, &c., with it, and to rub them well with a stiff brush until they are removed, after which the article may be well rubbed all over with a brush or sponge dipped into some warm water, to which the previous mixture and a little more ox-gall has been added. When this has been properly done, it only remains to thoroughly rinse the article in clean water until the latter passes off uncolored, when it must be hung up to dry. For dark-colored cloths the common practice is to add some fuller's earth to the mixture of soap and gall. When *nearly* dry, the nap should be laid right, and the article carefully pressed, after which a brush, moistened with a drop or two of olive oil, should be several times passed over it, which will give it a superior finish. Cloth may also be cleaned in the dry way as follows:—First, remove the spots as above, and, when the parts have dried, strew clean damp sand over it, and beat it in with a brush, after which brush the article with a hard brush, when the sand will readily come out, and bring the dirt with it. *Black cloth* which is very rusty, should receive a coat of reviver after drying, and be hung up until the next day, when it may be pressed and finished off as before. *Scarlet cloth* requires considerable caution. After being thoroughly rinsed, it should be repeatedly passed through cold spring water, to which a tablespoonful or two of solution of tin has been added. If much faded, it should be dipped in a scarlet dye-bath. *Buff cloth* is generally cleaned by covering it with a paste made with pipe-clay and water, which, when dry, is rubbed and brushed off.

Fruit spots and similar stains may frequently be removed by holding the part over a common brimstone match, lighted, or by water acidulated with a little salt of lemons, oxalic or muriatic acid; but care must be taken not to apply this liquid to colors that it will injure.

The stains of acids may be removed by washing the part with a little spirits of hartshorn or

liquid ammonia; *those of alkalis*, by water acidulated with lemon juice or tartaric acid.

Grease spots may generally be taken out by means of a little soft soap; or, if the color be delicate, or a false dye, a little ox-gall or curd soap will be better. These must be used as above described. *Stains of painters' oils, wax, paints, or varnishes*, will not usually yield to the above plan; in these cases, a simple way is to soak the part in spirits of turpentine, and, when softened, to wash it off with the same fluid. Ether or essential oil of lemons will also quickly remove these spots, but is too expensive for general use.

CLOTH, INCOMBUSTIBLE. This is made of fibres of asbestos by weaving. It will bear a considerable heat without injury. Cotton and linen fabrics prepared with a solution of sal ammoniac, or phosphate of ammonia, may be placed in contact with ignited bodies without danger. They will carbonize, but not inflame. Solutions of alum, sea salt, &c., have been used for the same purpose. It is by a knowledge of this property of culinary salt, that jugglers are enabled to perform the common trick of burning a thread of cotton while supporting a ring or a key, without the latter falling to the ground. The cotton is reduced to a cinder, but, from the action of the salt, its fibres still retain sufficient tenacity to support a light weight.

CLOTH, RENOVATION OF. The article undergoes the process of scouring before described, and, after being well rinsed and drained, it is put on a board, and the threadbare parts rubbed with a half-worn hatter's card, filled with flocks, or with a teazle or a prickly thistle, until a nap is raised. It is next hung up to dry, the nap laid the right way with a hard brush, and finished as before. When the cloth is much faded, it is usual to give it a "dip," as it is called, or to pass it through a dye-bath, to freshen up the color.

CLOTHES, BRUSHING AND PRESERVATION OF. If very dusty, hang them on a horse or line, and beat them with a cane; then lay them on a clean board or table, and well brush them, first with a stiff brush, to remove the spots of mud and the coarsest of the dirt, and next with a softer one, to remove the dust and to lay the nap properly. If clothes be wet and spotted with dirt, dry them before brushing, and then rub out the spots with the hands. The hard brush should be used as little as possible, and then with a light hand, as it will, if roughly and constantly employed, soon render the cloth threadbare. Should there be spots of tallow-grease on the clothes, take it off with the nail, or, if that cannot be done, have a hot iron with some thick brown paper, lay the paper on the part where the grease is, then put the iron upon the spot; if the grease comes through the paper, put on another piece, till it ceases to soil it.

After the clothes are brushed, they should be hung up in a clean place, free from dust, if wanted for immediate use; but if intended to remain unused for some time, they should be placed away on the shelves of the clothes' closet or wardrobe. The latter should always be in the driest situation possible, as if the clothes be exposed to the least damp, they not only acquire an unpleasant smell, but gradually become rotten.

CLOVES. The flower buds of the eugenia caryophyllata, dried and smoked. It is a common practice to adulterate this spice in the same manner as cinchona bark. Cloves from which the oil has been distilled are dried and rubbed between the hands, previously moistened with a little sweet oil, to brighten their color, after which they are mixed up with fresh spice for sale.

COACH ACCIDENTS. "Should the horses run off, in defiance of all restraint, while you are in a coach, sit perfectly still, and in anticipation of the possible overturn, keep your legs and arms from straggling. Sit easily and compactly, so that, when upset, you will gently roll over in the direction you are thrown. We have seen ladies in these circumstances scream wildly, and throw their arms out of the windows, thus exposing themselves to the chance of broken limbs. If run away with in a gig, either sit still collectedly, or drop out at the back, so as to fall on your hands. Never jump from a rapidly-moving vehicle, unless (supposing it impossible to slip down behind) you see a precipice in front, in which case any risk of personal damage is preferable to remaining still. The Duke of Orleans lost his life by neglecting these simple precautions."

COAK. *Syn.* COKE. CHARRED COAL. MINERAL CHARCOAL. Carbonized coal. The principle of its manufacture is similar to that of charcoal. There are three varieties of coak, viz.

I. (*Kiln-made coak. Stifled coak.*) Made by burning the coal in a pile, kiln, or stove. It has a dull black color, and produces an intense heat when used as fuel. The coal is frequently burnt in a series of shallow stoves, with as little access of air as will support the combustion, and the smoke conducted through proper horizontal tunnels to a capacious brick chamber, 100 yards or more in length, kept as cool as possible by a stream of water passing over its roof, or by a shallow pond resting on it. Here the bituminous vapors are condensed in the form of tar, along with a considerable quantity of crude ammoniacal salt. Common coal yields about 3℥ of tar when treated in this way, but some strong bituminous coal will give $\frac{1}{7}$ or $\frac{1}{8}$ of its weight. This tar, when inspissated, gives 75℥ of pitch, and 20 to 24℥ of a crude species of naphtha, that is excellent for out-door painting. The ammonia is made into sal ammoniac. The *screenings*, or dust-coal, separated from the better kinds of bituminous coal, is the sort commonly used for making coak in ovens.

II. (*Gas coak. Distilled coak.*) The cinder left in the retorts after the gas has been distilled off. Its color is gray, and it only produces a weak heat in burning, not sufficient to smelt iron.

III. (*Slate coak. Carbon mineral.*) From bituminous slate, burned in covered iron pots, in a similar way to that adopted for making bone-black. Also burnt in piles. It is black and friable. Used to clarify liquids, but vastly inferior to bone-black, and does not abstract the lime from sirups.

COBALT. *Syn.* REGULUS OF COBALT. A metal discovered by Brandt, in 1733. It is found in ores, associated with arsenic and other metals, and is constantly present in meteoric iron.

Prep. Dissolve oxide of cobalt in muriatic acid, and pass sulphureted hydrogen gas through the solution, until all the arsenic is thrown down; filter and boil with a little nitric acid, then add an ex-

cess of carbonate of potassa, and digest the precipitate in a solution of oxalic acid to remove any oxide of iron; wash and dry the residuum, which is the pure oxalate, and expose it to heat, either in a retort or crucible, from which the air is excluded, when *pure metallic cobalt* will be obtained.

II. Mix equal parts of oxide of cobalt and soft soap, and expose them to a violent heat in a covered crucible.

III. Roast Cornish cobalt ore, then powder it, and smelt it with twice its weight of soft soap.

Remarks. Cobalt is seldom employed in the metallic state, from the great difficulty of reducing its ores, but its oxide is largely used in the arts. It has been said to form three compounds with oxygen, but only one—the black or peroxide—is employed. It forms salts with the acids, which are interesting from the remarkable changes of color which they exhibit. The *sulphate* is formed by boiling sulphuric acid on the metal, or by dissolving the oxide in the acid. It forms reddish crystals, soluble in 24 parts of water. The *nitrate*, made in a similar way, forms deliquescent crystals. The *muriate* may be made by dissolving the oxide in muriatic acid; the neutral solution is blue when concentrated, and red when diluted; the addition of a little acid turns it green. Dissolved in water, it forms a *sympathetic ink*, the traces of which become blue when heated, but if the salt be contaminated with iron, they become green. (Klaproth.) The addition of a little nitrate of copper to the above solution, forms a sympathetic ink, which by heat gives a rich greenish-yellow color. (Ure.) The addition of a very little common salt makes the traces disappear with greater rapidity, on the withdrawal of the heat. The *acetate* forms an ink which turns blue when heated. The *oxalate* and *phosphate* may be formed by digesting the oxide in a solution of the acid, or by double decomposition. The latter salt is an insoluble purple powder, which, when heated along with 8 times its weight of gelatinous alumina, produces a blue pigment, almost equal in beauty to ultramarine. With sulphur cobalt unites, forming a sulphuret, and with phosphorus a phosphuret.

Char. and Tests. The neutral salts of cobalt form red solutions, turning green on the addition of an excess of the acids, and giving a blue-colored precipitate with the alkalis, unless arsenic be present, when the color will be brown. Their solutions are unaffected by sulphureted hydrogen, but hydro-sulphuret of ammonia throws down a black powder, soluble in an excess of the precipitant. If the solution contain arsenic, a yellow powder is first precipitated, after which the filtered fluid will remain unaffected by sulphureted hydrogen gas. Tincture of galls gives a yellowish-white precipitate, and the solution of oxalic acid a red one.

COBALT, OXIDE OF. *Syn.* Black Oxide of Cobalt. Cobalt Black. *Prep.* To a solution of muriate of cobalt, add another of carbonate of potassa as long as it produces a precipitate; filter, wash, and dry.

II. Boil powdered bright-white cobalt ore (from Cornwall) in nitric acid; dilute with a large quantity of water, and add a solution of carbonate of potassa, very gradually, until the clear liquor, after the impurities have settled, becomes of a rose color: then add the potash water as long as a precipitate falls; wash and dry.

Use. To make blue colors for painters, enamellers, and potters. In medicine it has occasionally been used as a remedy for rheumatism.

COCCULUS INDICUS. The fruit of a shrub (the menispermum cocculus) which abounds on the sandy shores of Malabar, and other parts of the East Indies. It contains about 2% of picrotoxin, a peculiar vegetable principle, possessing very poisonous properties. It also contains menispermine and paramenispermine. (Pelletier and Couerbe.) A small portion of this dangerous drug is used by poachers, and a still smaller quantity to destroy vermin, the remaining, and by far the greater part, being used to adulterate beer and wine. It forms a profitable article of trade to the wholesale druggist, who is enabled to sell it at a high price to brewers, from its being a contraband article. The use of cocculus indicus in brewing is no secret, as several writers have openly recommended its use. One of these conscientious gentlemen states, that "it is impossible with pure malt and hops alone, to produce a strong-bodied porter;" he therefore recommends the use of "cocculus indicus, grains of Paradise, and nux vomica." (Childe, on Brewing.) Another author, with the most unblushing effrontery, actually gives full directions for its use. He orders 3 lbs. of cocculus to be used for every 10 quarters of malt, and adds, "it gives an inebriating quality, which passes for strength of liquor; it prevents second fermentation in bottled beer, and consequently, the bursting of the bottles in warm climates." (Morrice's Treatise on Brewing.) It is really disgusting to find that men can so degrade themselves, as thus publicly to recommend a wholesale system of slow poisoning. The conscientious brewer, who understands the art which he professes, finds no difficulty in producing "a strong-bodied porter" from malt and hops alone. It is only persons whose cupidity induces them to reduce the quantity of malt and hops required for the production of good liquor, that encounter any difficulty in so doing. There is a penalty of 200*l.* upon the brewer for purchasing or having in his possession any ingredient for the adulteration of beer, and there is a penalty of 500*l.* upon the seller of such ingredients. Yet, in defiance of these heavy fines, the trade in these articles is unabated, though carried on in a clandestine manner. The general way this is managed, is to pack the drug in common soda barrels, and to place 3 or 4 inches of small crystals of Scotch soda at the bottom and top of the cask. In this way the package readily passes off as a cask of common soda, and even should it be opened, the alkali would first present itself to view, and thus satisfy the examiner. Another way commonly adopted, is to form it into an extract, known by the name of B. E., or *black extract*, which is *ostensibly* prepared for tanners, but its real destination is the beer cask. The store of a certain druggist, which came under my examination some short time since, contained an immense number of bags of this article; in fact, it formed at least one fourth of the entire stock.

COCHENILLIN. *Syn.* Cochineal Red. Carminium. Carminia. Pure Carmine. The coloring principle of cochineal. The carmine of commerce consists of cochenillin, combined with a

little animal matter and an acid, from which it may be nearly purified by solution in liquid ammonia, and precipitations by acetic acid, mixed with alcohol. Cochenillin may also be prepared by evaporating a watery infusion of cochineal to the consistence of sirup, dissolving this in proof spirit, filtering, again evaporating, and dissolving the residuum in liquid ammonia as before. It is turned orange by acids, and violet by alkalis. It has been obtained under the form of reddish-purple crystalline grains.

COCKLE POWDER. Cockles pulped through a sieve, made into a paste with flour, and a little salt, and then rolled out into thin pieces and dried. It is next reduced to powder, sifted, and packed in well-corked bottles. *Use.* To make sauce, (about ½ oz. to ½ pint.)

COCOA. I. The roasted husks of the cacao, or chocolate bean, reduced to powder by grinding.

II. The cake left after expressing the oil from the beans.

COCOA, PATENT. The cacao nut roasted and ground, (including the husks.)

COCOA, FLAKED. Ground cocoa strongly compressed, and flaked with a sharp knife or machine.

COCOA, SOLUBLE. Cocoa ground to a very fine powder, and mixed with sugar. It is thus rendered miscible with boiling water.

Remarks. Cocoa forms a very wholesome beverage, especially for breakfast. Much of the cheap stuff sold under this name is very inferior, being made with damaged nuts that have been pressed for the oil, mixed with potato flour, mutton suet, &c. Trash of this kind is frequently ticketed in the shop windows of London at 6*d.* to 8*d.* a pound. (See CHOCOLATE.) The nut of the palma cocos is commonly confounded with that of the theobroma cacao. The latter is the small chocolate bean, while the former is the large nut, filled with a refreshing milky juice.

COD. This excellent fish is in season from the beginning of October to the end of April. It should be chosen by the redness of the gills, freshness of the eyes, and the whiteness and firmness of the flesh. The best fish are very thick about the neck. It is generally cooked by boiling, but is sometimes baked, or cut into slices and broiled or fried. Cod's head and shoulders, with oyster sauce, is a favorite dish. Shrimp and anchovy sauce are also good additions. The flesh of the cod is often split and dried, (dried cod,) or salted. The fish so largely imported from Newfoundland are cod, beheaded, split open, gutted and salted. They are caught by millions on the "Grand Bank." Cod-sounds are pickled in brine and also made into isinglass. The liver is boiled for its oil, and the spawn made into caviare.

CODEIA. *Syn.* CODEINE. An alkaloid discovered by Robiquet associated with morphia.

Prep. Dissolve commercial hydro-chlorate of morphia in water, precipitate with ammonia, evaporate and crystallize. The product is a double salt of morphia and codeine, and when digested with warm liquor of potassa gives up its morphia. It may be further purified by solution in ether, and by the addition of a little water and spontaneous evaporation may be obtained quite pure and in a crystalline state.

Prop. Soluble in alcohol, ether, and water. Its solution in the latter, by slow evaporation, yields large transparent octohedrons. With the acids it forms crystallizable salts. These possess the singular property of producing a general and violent itching of the surface of the body when administered internally. The same symptoms frequently follow the exhibition of opium and muriate of morphia, and are referred to the presence of a salt of codeia. (Gregory.) The commercial muriate frequently contains 3 to 4§ of codeia.

Char. and Tests. It is distinguished from *morphia* by not becoming blue on the addition of the sesquichloride of iron, nor turning red with nitric acid, and by not being precipitated by ammonia, when dissolved in muriatic acid and mixed with a large quantity of water. Unlike morphia, it is insoluble in liquor of potassa and is soluble in ether. The salts of codeia may also be known by tincture of galls throwing down a copious precipitate from their solutions, but this does not occur in the salts of morphia. It may be distinguished from meconine by its aqueous solution showing an alkaline reaction with test paper.

COFFEE. The berry of the coffæa Arabica. II. A decoction or infusion prepared therefrom.

Qual. Coffee promotes digestion and exhilarates the spirits, and when strong generally occasions watchfulness, but in some phlegmatic constitutions induces sleep. Drunk in moderation, especially if combined with sugar and milk, it is perhaps the most wholesome beverage known. The various qualities that have been ascribed to it by some persons, such as dispelling or causing flatulency, removing dizziness of the head, attenuating the blood, causing biliousness, &c., appear to be wholly imaginary. In a medical point of view it has been regarded as diuretic, sedative, and a corrector of opium. It should be given as medicine in a strong infusion, and is best cold. In spasmodic asthma it has been particularly serviceable; and it has been recommended in gangrene of the extremities arising from hard drinking. (See CAFFEIN.)

Pur. The most common adulteration of ground coffee is chicory, which is added not only to cheapen the article, but to improve the flavor of damaged or inferior berries. This adulteration may be readily detected by shaking a spoonful of the suspected coffee with a wine-glassful of water, when, if it be pure, it will swim and scarcely color the liquid, but if chicory be present, it will sink to the bottom, and the water will be tinged of a deep red. *Roasted corn* is another common adulteration. This may be detected by the cold decoction striking a blue color with tincture of iodine.

COFFEE CREAM. *Prep.* Add a teacupful of very clear strong coffee to 1 pint each of clarified calf's feet jelly and good cream; sweeten with lump sugar, give it one boil up, and pour it into shapes or glasses, when nearly cool. The calf's feet jelly should be thick enough to render the whole lightly solid but not stiff.

COFFEE DROPS. *Prep.* Make an infusion with 1 oz. of coffee, clarify it, and moisten 1 lb. of sugar therewith, in the way directed for confectionary drops.

COFFEE, ESSENCE OF. A concentrated infusion of coffee prepared by percolation, to which

of soda, filtering, boiling the globules with alcohol acidulated with sulphuric acid, again filtering, adding carbonate of magnesia to separate the sulphuric acid, and after filtering, evaporating to dryness. A dark reddish-brown mass.

HÆMOPTYSIS, (from ἁιμα, *blood*, and πτυω, I spit.) Spitting of blood. It generally arises from extreme fulness of the blood-vessels of the lungs, or the rupture of blood-vessels, as a consequence of ulceration. Bleeding, aperients, acidulous and astringent drinks, and nauseants, are the usual remedies. Sugar of lead, in small doses, has been recommended for this affection. It should be accompanied with a sufficient quantity of free acetic acid, to prevent its being converted into the poisonous carbonate of lead in the system.

HÆMORRHAGE. *Syn.* HÆMORRHAGIA, (from ἁιμα, *blood*, and ῥαγη, *rent.*) A bleeding or flow of blood. Bleeding may be divided into *active*, *passive*, and *accidental*. *Active hæmorrhage* is that arising from a full state of the vessels, or plethora; *passive hæmorrhage* from general debility of the system, and the blood-vessels in particular; *accidental hæmorrhage* from external violence, as blows, wounds, &c. The *first* generally requires depletion, and the *second* the usual treatment to establish the general health and vigor of the body. The bleeding from wounds, if extensive, should be arrested by tying the ruptured blood-vessels, or where this cannot be done, and in less important cases, by the application of styptics, as creosote, sulphate of iron, infusion of galls, compound tincture of benzoin, &c.

HAIR DYES. *Prep.* I. (Dr. Hanman.) Litharge 275 grs.; quicklime 1875 grs.; hair powder (starch) 930 grs.; all in fine powder; mix. For use, this powder is made into a paste with warm water or milk, and immediately applied to the hair by means of the fingers, observing to rub it well into the roots. The whole must be then covered with a moist leaf of cotton wadding, several times doubled, and allowed to remain so for 3 hours, or preferably all night. The powder may then be removed by rubbing it off with the fingers, and afterwards washing it with warm soap and water. A little pomatum or hair oil will restore the usual gloss to the hair. This is one of the most innocent preparations of the kind. Like all other hair dyes, it must be reapplied as soon as the hair by growing begins to expose an undyed surface underneath. A piece of oil skin, or even a cabbage leaf, may be used instead of cotton wadding.

II. (Orfila's.) Litharge 6 parts; quicklime 5 parts; starch 1 part. As last.

III. (Delcroix's.) Acetate of lead 2 oz.; prepared chalk 3 oz.; quicklime 4 oz. As before.

IV. (Spencer's.) Sap green ½ dr.; nitrate of silver 1 dr.; hot water 1 oz.; dissolve. Applied to the hair by means of a comb moistened with it. Stains the skin as well as the hair.

V. (Howlet's.) Similar to the last.

VI. (*Pomade dye.*) Nitrate of silver 1 part; nitric acid 2 parts; iron filings 2 parts; mix, and let them stand together for 4 or 5 hours, then pour them on oatmeal, 2 parts; next add lard 3 parts; and mix well together. Stains the skin without great care.

VII. (*Instantaneous.*) Moisten the hair first with a solution of nitrate of silver in water, (1 to 7 or 8,) and then with a weak solution of hydrosulphuret of ammonia. The color of the hair, before unaltered, instantly turns black.

VIII. The juice of the bark of green walnuts. (Paulus Ægineta.)

IX. Employ a *leaden* comb.

Remarks. All the preceding are for dyeing living hair, (human;) horse-hair and other dead hair may be colored by steeping them in any of the ordinary dyes.

HAMS. (In DOMESTIC ECONOMY.) These are usually prepared from the legs of pigs, but those of the sheep are also sometimes used for the same purpose. *Smoked ham* is strong eating, and rather fit for a relish than for diet.

Choice. Stick a sharp knife under the bone, if it has a pleasant smell when withdrawn, the ham is good; but if the contrary, it should be rejected. The recently cut fat should be hard and white, and the lean fine-grained, and of a lively red. Legs of pork short in the hock should alone be chosen for making into hams, as the lanky sort not only look less sightly, but are deficient in flavor.

Curing. Hams are prepared in the usual way for salting, either by immersion in the pickle, or by rubbing the salt over them. A little powdered saltpetre should be well rubbed over them an hour before salting them: moist sugar is frequently mixed with the salt, or treacle is put into the brine to improve the flavor; a little spice (powdered allspice) and black pepper are also occasionally used for a like purpose. An ordinary sized ham will require nearly three weeks, if wet salted, and about a month if *dry* salted, to cure it perfectly. At the expiration of this time, they are ready for smoking. *Mutton hams* are prepared in a similar manner, but should not lie in pickle longer than 12 days or a fortnight. (See ANIMAL SUBSTANCES USED AS FOOD, and SALTING.)

Cooking. Preparatory to the cooking of hams, they should be well soaked in water, to which a little vinegar or milk may be added. They are also preferably boiled in milk and water, or water alone, along with some heads of celery, 2 or 3 turnips, 5 or 6 onions, and a handful of sweet marjoram, thyme, and basil. Hams should be put into the water *cold*, and should be gradually heated. A ham of 16 lbs. will take 4½ hours, and one of 20 lbs. 5½ hours to dress it properly. (See BAKING.)

HAMS, PRESERVATION OF. Most grocers, dealers in hams, and others, who are particular in their meat, usually take the precaution to case each one, after it is smoked, in canvass, for the purpose of defending it from the attacks of the little insect, the dermestes lardarius, which, by laying its eggs in it, soon fills it with its larvæ, or maggots. This troublesome and expensive process may be altogether superseded by the use of pyroligneous acid. With a painter's brush, dipped in the liquid, one man, in the course of a day, may effectually secure two hundred hams from all danger. Care should be taken to insinuate the liquid into all the cracks, &c., of the under surface. This method is especially adapted to the preservation of hams in hot climates.

HANDS. *Dirty and coarse hands* are no less

the marks of slothfulness and low breeding, than clean and delicate hands are those of cleanliness and gentility. To promote the softness and whiteness of the skin, mild emollient soaps, or those abounding in oil, should alone be used, by which means chaps and chilblains will generally be avoided. The coarse, strong kinds of soap, or those abounding in alkali, should for a like reason be rejected, as they tend to render the skin rough, dry, and brittle. The immersion of the hands in alkaline lyes, or strongly acidulated water, has a like effect. When the hands are *very* dirty, a little good soft soap may be used with warm water, which will rapidly remove oily and greasy matter. *Fruit and ink stains* may be taken out by immersing the hands in water slightly acidulated with oxalic acid, or a few drops of oil of vitriol, or to which a little pearlash or chloride of lime has been added, observing afterwards to well rinse them in clean water, and not to touch them with soap for some hours, as any alkaline matter will bring back the stains, after their apparent removal by all the above substances, except the last. The use of a little chloride of lime and warm water, or GOWLAND'S LOTION, will impart a delicate whiteness to the skin; but the former should be only occasionally used, and should be well washed off with a little clean water to remove its odor. The use of a little sand, or powdered pumice-stone, with the soap, will generally remove the roughness of the skin, frequently induced by exposure to cold. The hands may be preserved *dry* for delicate work, by rubbing a little club moss, (lycopodium,) in fine powder, over them. A small quantity of this substance sprinkled over the surface of a basin of water, will permit the hand to be plunged to the bottom of the basin without becoming wet. (See COSMETIC, SIMPLE.)

HANNAY'S LOTION. *Syn.* HANNAY'S PREVENTIVE WASH. A solution of potash in water. Used to prevent infection.

HARDNESS. *Syn.* DURETE, (*Fr.*) HARTE; FESTIGKEIT, (*Ger.*) DURITIA; DURITIES, (*Lat.*) In PHYSICS, the power possessed by bodies of resisting abrasion. In MINERALOGY, mineral substances are frequently distinguished and identified by their relative hardness. This is ascertained by their power to scratch or be scratched by one another. A valuable table on this subject will be found under the article GEM, p. 331.

HARMALINE. A basic substance, forming yellow-brown crystals, discovered by Göbel in the seeds of peganum harmala. It has a bitter astringent and acrid taste, and forms yellow soluble salts with the acids. It has been proposed as a yellow dye. By *oxidation* it yields a magnificently red dye-stuff, which is easily prepared and applied. (Göbel.) The seeds are produced abundantly in Russia, so that it appears probable that, ere long, they may become an article of commerce.

HARTSHORN, BURNT. *Syn.* CORNU USTUM, (P. L.) PULVIS CORNU CERVINI USTUM, (P. D.) CORNU USTUM ALBUM. *Prep.* (P. L.) Burn pieces of harts' horns until perfectly white, then grind and prepare them in the same way as directed for PREPARED CHALK.

Remarks. Finely-powdered bone-ash is usually sold for burnt hartshorn, and possesses exactly the same properties. *Dose.* 10 grs. to ʒss 2 or 3 times a day, in rickets, &c. (See PHOSPHATE OF LIME.)

HARTSHORN SHAVINGS. *Syn.* HARTSHORN RASPINGS. RASURA CORNU CERVI. RAMENTA CORNU CERVI. Obtained from the turners. By boiling in water they yield a nutritive jelly. Used by straw-plait workers to stiffen bonnets, &c.

HATS. In purchasing a hat, choose one possessing a *short*, smooth, fine nap, and a good black color; and that is light and sufficiently elastic to resist ordinary wear and tear, without breaking or giving way. The hat brush for *daily* use should be made of long soft hairs, but a stiffer one should be employed *occasionally*, to lay the nap smooth and close.

HEADACHE. *Syn.* CEPHALALGIA, (*Lat.*) The symptoms of this very general complaint are too well known to require any description. According to pathologists, headache arises, either from a sympathy with the stomach and chylopoietic (chyle-forming) viscera, or from a weakness or exhaustion of the power of the encephalon. The former may be called *sympathetic*, and the latter *nervous headache*. The treatment of the first should consist in restoring the healthy action of the stomach by the administration of aperients, and the use of proper food and exercise, or when that viscus is overloaded with undigested food, by the exhibition of an emetic. For this purpose ¼ to ½ an oz. of ipecacuanha wine may be taken in a cupful of warm water, which will generally relieve the stomach, especially if its action be assisted by drinking copiously of warm water. (See EMETICS.) Headache is a common accompaniment of indigestion and stomach diseases, and in general it will be found that whatever will remove the latter will also cure the former. (See DYSPEPSIA.) *Nervous headaches* are relieved by nervous tonics and stimulants; as bark, cascarilla, calumba, gentian, camphor, ammonia, ether, and wine; the latter in a state of considerable dilution. A cup of strong coffee or strong green tea often acts like a charm in removing this species of headache. Small doses of tincture of henbane will also have a like effect. 20 or 30 drops of laudanum, or preferably, half that number of liquor opii sedativus, may be taken with advantage as an anodyne, and to induce sleep. Among *popular remedies* may be mentioned "nasal stimulants," as snuff, (cephalic,) smelling salts, and aromatic vinegar, the use of which is familiar to every one; and local applications, as very cold water, ether, vinegar, strong spirits, Cologne water, &c., all of which are rubbed over the part of the head affected, with the fingers; or a linen rag dipped in them is laid thereon instead. Pressure on the head has also been used with advantage. Silence, darkness, and repose, are also powerful remedies, alike suitable to every variety of headache; and change of air, scene, and occupation, are especially beneficial to those resulting from excessive mental anxiety or exertion. Blisters are sometimes applied behind the ears in cases of violent headache.

Headache is often symptomatic of other diseases, especially those of the inflammatory and nervous kind, rheumatism, &c. In all these cases, the primary disease should be sought out and attempted to be cured. *Headache in pregnancy* may

therefore, be properly protected from its action. Woollen stockings or socks, with good shoes or boots, should be worn on the feet, and the body should be clad in thick woollen fabrics, proportioned to the inclemency of the weather, and the habits of the wearer. The circulation of the blood should be promoted by active exercise, and any disposition to sleep shaken off by increased bodily exertion. If the situation be such that exercise cannot be had recourse to, drowsiness is more likely to be experienced, and must be warded off, if possible, by keeping the mind incessantly and actively engaged. The principal endeavor should be to keep the extremities warm, as, if this be accomplished, no danger need be feared. In travelling by coach or on horseback, recourse may be had to hay and straw, which may be thrown over the feet and legs, and will materially ward off the effects of the weather.

Remedial measures for asphyxia produced by intense cold.—The patient should be laid in a room remote from the fire, and bathed with cold salt and water, after which the body should be wiped dry, and friction applied by the hands of the attendants, (warmed ;) as many operating at once as can conveniently do so. Gentle stimulants should be administered by the mouth, and the bowels excited by some mild stimulating clyster. The lungs should also be inflated. (See ASPHYXIA.) As soon as symptoms of returning animation are evinced, and the breathing and circulation restored, the patient should be laid in a bed between blankets, and a little wine and water administered, and perspiration promoted by heaping an ample quantity of clothing on the bed. Should the patient have suffered from hunger as well as cold, the appetite may be appeased by the administration of a limited quantity of light food, taking especial care to avoid excess, or any thing indigestible or exciting.

COLIC. (From κωλον, the colon, the supposed seat of the disease.) The colic or bellyache. This name is commonly given to all severe griping abdominal pains, whatever may be the cause. This disease has been distinguished by nosologists into several varieties, as follows:—

I. (*The spasmodic colic.*) This kind is marked by a fluctuating pain about the navel, which goes away and returns by starts, often leaving the patient for some time. The belly is usually soft, and the intestines may often be felt in lumps, which move about under the hand, or wholly vanish for a time. It is unaccompanied by flatulency. *The remedies* are, warm fomentations, warm clysters, and carminatives, accompanied by small doses of camphor and opium.

II. (*The stercoraceous colic.*) This is marked by severe griping pains and constipation of the bowels. *The remedies* are powerful cathartics, as full doses of calomel, aloes, colocynth, jalap, &c., followed by purgative salts, as sulphate of magnesia or soda.

III. (*Bilious colic.*) In this variety the pain is intermittent and transient, accompanied by constipation, nausea, and vomiting. The fæces, if any, are bilious, dark-colored, and offensive. *The remedies* are, a full dose of blue pill, calomel, colocynth, or aloes, followed by a sufficient quantity of epsom or glauber salts. Warm fomentations are also serviceable.

IV. (*Flatulent colic.*) Marked by constipati and the irregular distension of the bowels by g accompanied by a rumbling noise, &c. It is co monly produced by the use of flatulent vegetab and slops. *The remedies* are, a full dose of ti ture of rhubarb combined with a few drops of e sence of peppermint. If this does not afford reli a pill made of 3 grs. of blue pill and 2 grs. of co pound extract of colocynth, may be taken, wash down with a glass of any cordial water, as pepp mint, cinnamon, or caraway. If the pain be e treme, warm fomentations to the belly, or a ca minative clyster may be adopted.

V. (*Accidental colic.*) Produced by improp food and poisons. The treatment differs but litt from the last variety.

VI. (*Colica pictonum. Devonshire coli Plumber's do. Painter's do. Lead do.*) Th dry bellyache. This species of colic is marked b obstinate costiveness, acrid bilious vomitings, vi lent pains about the region of the navel, convulsi spasms in the intestines, and a tendency to para lysis in the extremities. It is most prevalent i the cider counties, and among persons exposed t the fumes of lead. *The remedies* are the same a for the spasmodic variety. Should these fail, aft the bowels have been thoroughly evacuated, sma doses of camphor and opium may be administere Mr. Benson, the managing director of the Britis Whitelead Works at Birmingham, strongly recom mends the use of sulphuric acid; he says: "I me with a statement some time since that sulphuri lemonade has been successfully used at a whit lead manufactory in France as a preventive of th injurious effects of white lead; and it occurred t me that by adding *sulphuric acid* to the treacle beer then used by our people, its supposed efficacy might be tested. This idea was carried into effec in the summer of 1841, and the results have prove most gratifying, as, although during several week after the addition of the sulphuric acid to the trea cle beverage, little advantage seemed to be derived yet the cases of lead colic became gradually les frequent, and since October of that year, or during a period of fifteen months, not a single case of lead colic has occurred among the people." (Lancet.)

The following is Mr. Benson's form for his trea cle or sulphuric beer:—Take of treacle 15 lbs.; bruised ginger ½ lb.; water 12 gallons; yeast 1 quart; bicarbonate of soda 1½ oz.; sulphuric aci (oil of vitriol) 1½ oz. by weight: boil the ginger in 2 gallons of water; add the treacle and the re mainder of the water, hot; when nearly cold trans fer it to a cask, and add the yeast to cause fer mentation; when this has nearly ceased, add the sulphuric acid, previously diluted with eight times its quantity of water, and then add the bicarbonate of soda, dissolved in one quart of water. Close up the cask, and in three or four days the beer will be fit for use. As acetous fermentation speedily takes place, particularly in hot weather, new supplies should be prepared as required.

COLOCYNTHINE. *Syn.* COLOCYNTHIN. COLOCYNTHIUM. The purgative bitter principle of the colocynth.

Prep. Digest the aqueous extract or the pulp of colocynth in alcohol, filter and evaporate the tinc ture. The residuum is colocynthine combined with acetate of potassa. By agitation with a *little*

water the latter is removed. It may be purified by re-solution in alcohol, and evaporation.

Prop. A yellowish brown translucent resinous substance, very soluble in alcohol, less so in ether, and only slightly so in water. It is intensely bitter, and acts as a drastic purgative.

COLORING. *Syn.* Brewer's Coloring, Brandy do. Spirit do. Essentia Bina. Caramel. *Prep.* Melt brown sugar in an iron vessel over the fire, until it grows black and bitter, stirring it well all the time, then make it into a sirup with water.

Remarks. Some use lime-water to dissolve the burnt sugar. Care must be taken not to overburn it, as a greater quantity is thereby rendered insoluble. The heat should not exceed 430°, nor be less than 400°. The process for nice experiments is best conducted in a bath of melted tin, to which a little bismuth has been added to reduce its melting point to about 435°; a little powdered resin or charcoal, or a little oil being put upon the surface of the metal to prevent oxidizement.

COLORS, COMPOUND. (In Dyeing.) The mixture of blue and yellow dyes produces *green;* red and blue, *violet, purple, lilacs, &c.;* red and yellow, *orange, cinnamon, &c.;* red, yellow, and blue, *olives;* red and blues, or green or black, *browns* of all shades; black mixed with other dyes produces various shades of *brown* and *olive*, and when pale it constitutes *gray*, either by itself or the addition of a faint blue.

COLOMBIUM. A rare metal, discovered by Mr. Hatchet in 1801, in a black mineral belonging to the British Museum. Supposed to have been brought from America, hence the name. (See Tantalum.)

COLUMBIC ACID. The preceding metal exists in its ores in the form of an acid, united to iron, manganese, or yttria. From these it may be obtained by fusion with 3 or 4 parts of potash, solution in water, and precipitation with an acid. It falls as a white powder or hydrate.

CONCENTRATION. (In Chemistry.) The volatilization of part of a liquid in order to increase the strength of the remainder. The operation can only be performed on solutions of substances of greater fixity than the menstrua in which they are dissolved. Many of the liquid acids, solutions of the alkalis, &c., are concentrated by distilling off their water.

(In Pharmacy.) The term "concentrated" is very commonly applied to any liquid preparation possessing more than the usual strength. Thus we have "*concentrated*" *infusions, decoctions, liquors, solutions, tinctures,* and *essences,* most of which are made of 8 times the common strength. This is generally effected by using 8 times the usual quantity of the ingredients, with a given portion of the menstruum, and operating by digestion or percolation; the latter being generally adopted when the articles are bulky. When the menstruum is water, a little spirit is added to make the product keep.

CONCRETE. (In Architecture.) A compact mass, composed of pebbles, lime, and sand, employed in the foundations of buildings. The best proportions are 60 parts of coarse pebbles, 25 of rough sand, and 15 of lime.

CONDIMENTS. Substances taken with the food, to improve its flavor, or to render it more wholesome or digestible. The principal condiments are common salt, vinegar, lemon juice, spices, aromatic herbs, oil, butter, sugar, honey, and sauces. Most of these, in moderation, promote the appetite and digestion, but their excessive use tends to injure the stomach, and vitiate the gastric juice.

CONFECTIONS. (In Pharmacy.) Medicines, usually pulverulent, mixed up to the consistence of a paste with powdered sugar, sirup, or honey. In the "London Pharmacopœia," both conserves and electuaries are included under this head, though there appears to be some little distinction between them. As remedial agents, the officinal confections possess but little value, and are chiefly useful as vehicles for the administration of more active medicines. In making confections, the sugar requires the same attention as for sirups. They should be kept in stone jars, covered with writing paper, and placed in a cool and dry situation. Without this precaution, they are apt to mould on the top. All the dry ingredients employed in making confections should be reduced to a very fine powder, and passed through a sieve not coarser than 80 holes to the inch.

CONFECTION OF ALMONDS. *Prep.* (*Confectio Amygdalæ*, P. L.) Sweet almonds ℥viii; white sugar ℥iv; powdered gum arabic ℥j. Macerate the almonds in *cold* water, then remove the skins, and beat them with the other ingredients until reduced to a smooth confection.

Use. To prepare milk of almonds. A little of this paste or powder, triturated with a sufficient portion of water, and strained through a piece of calico, forms emulsion of almonds.

CONFECTION OF ALKERMES. *Prep.* White sugar 1 lb.; rose-water ¼ pint; clarified juice of alkermes 3 lbs.; oil cinnamon 10 or 12 drops. Mix. It was formerly a common practice to add a little gold-leaf, rubbed small, so as to float about in it; also musk and ambergris.

CONFECTION OF ALUM. *Prep.* (*Conf. Aluminis*, St. B. H.) Alum in fine powder, 80 grs.; conserve of roses, enough to mix. *Use.* As an astringent.

CONFECTION, AROMATIC. *Syn.* Sir Walter Raleigh's Cordial. Confectio Raleighana, (P. L. 1720.) Ditto Cardiaca, (P. L. 1745.) Ditto Aromatica, (P. L. 1788, and since.) *Prep.* I. (P. L.) Nutmegs, cinnamon, and hay saffron, of each ℥ij; cloves ℥j; cardamoms ℥ss; prepared chalk ℥xvj; white sugar lbs. ij. Reduce the whole to a very fine powder, and keep it in a closed vessel. When wanted for use, mix it with water to the consistence of a confection.

Remarks. On the large scale the above form is seldom adhered to. Less saffron is commonly used, cassia is substituted for cinnamon, and, generally, the essential oil for the powder of cloves. Should there be any deficiency of color, this is brought up by a little tincture or infusion of turmeric. When a very smooth and fine powder is desired, it should be passed through a gauze sieve, not coarser than 80 holes to the inch, and precipitated chalk should be employed. The saffron should be dried with as little heat as possible, and care should be taken not to waste any in powdering. The following formula, which is employed by a large whole-

sale druggist in the city, produces an excellent article.

II. Hay saffron, cassia, and turmeric, of each 4 oz.; cardamoms 1 oz.; starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oil of nutmegs 2 drachms; oil of cloves 3 drachms. Reduce the dry ingredients to fine powder, and pass it through an 80 hole sieve, then add the oils, and after well mixing, pass it through a coarse sieve, (about 40 holes to the inch,) to ensure the whole being perfectly mixed.

The following form produces a powder possessing great depth and brilliancy of color.

III. Hay saffron 4 oz.; turmeric 3 oz.; powdered starch 8 oz.; precipitated chalk 2 lbs.; white sugar 4 lbs.; oils of cloves and cassia, of each 3 drachms; oil of nutmegs 2 drachms; essence of cardamoms 1 oz. *Proc.* Boil the saffron and turmeric in 1 gallon of water, placed in a bright copper pan, for 10 minutes, then, without straining, add the chalk, starch, and sugar; mix well, and continue stirring until the mixture becomes quite stiff, then break it up and dry it until fit for powdering. This must be performed in a water or steam bath. To the powder, passed through a fine sieve, as before, the oils and tincture must be added, and after being well mixed, and passed through a coarse sieve, it should be placed in a jar or bottle, and bunged up close.

Remarks. In the wholesale trade this article is kept under two forms: one in powder, as ordered by the College, and commonly called, for distinction sake, "*pulvis confectionis aromaticæ;*" the other mixed up ready for use. In preparing the latter, it is a common plan to make a strong infusion or decoction of the saffron, and to use it to mix up the other ingredients. Some persons follow the method described in the last formula, mixing up the powder to a proper consistence with water before adding the aromatics. When the price of *precipitated* chalk is an objection to its use, *prepared* chalk may be used instead. This confection is cordial, stimulant, and antacid. *Dose.* 10 to 60 grs.

CONFECTION OF BLACK PEPPER. *Syn.* WARD'S PASTE. *Prep.* (*Confectio Piperis Nigri*, P. L.) Black pepper and elecampane root, of each lb. j; fennel seed lb. iij; honey and white sugar, of each lb. ij; mix.

Remarks. The common practice is to keep the dry ingredients ready mixed in a bottle, and only to add the honey as wanted. The proportions are 2 parts of the latter to 7 of the mixture. The *dose* is 1 to 2 drachms 2 or 3 times a-day, in piles, fistula, &c. It should be persevered in for 2, 3, or 4 months, (Sir B. Brodie;) and as it is apt to accumulate in the bowels, its use should be accompanied by mild aperients. (Pereira.)

CONFECTIONS OF CASSIA. *Syn.* ELECTUARIUM CASSIÆ, (P. L. 1788.) *Prep.* (*Confectio Cassia*, P. L.) Fresh cassia pulp lb. ss.; manna ℥ij; tamarind pulp ℥j; sirup of roses f℥viij. Bruise the manna and dissolve it in the sirup, then add the pulps and evaporate to a proper consistence.

CONFECTION OF HEMLOCK. (Dr. Osborne.) *Prep.* Fresh leaves of hemlock and moist sugar equal parts; beat them to a confection in a mortar.

CONFECTION OF OPIUM. *Syn.* PHILONIUM ROMANUM, (P. L. 1720.) DITTO LONDINENSE, (P. L. 1745.) CONFECTIO OPIATA, (P. L. 1788.) DITTO OPII, (P. L. 1809, and since.) *Prep.* (P. L.) Powdered opium ʒvj; long pepper ℥j; ginger ℥ij; caraways ℥iij; tragacanth ʒij; all in fine powder; sirup f℥xvj. Mix.

Use and Dose. This confection is intended as a substitute for the *mithridate* and *theriaca* of the old Pharmacopœia. It is stimulant and narcotic, and is given in flatulent colic and diarrhœa unaccompanied by fever. The dose is from 15 to 50 grs.

CONFECTION OF ORANGE PEEL. *Syn.* CONSERVA FLAVEDINIS CORTICUM AURANTIORUM, (P. L. 1720 and 1745.) DITTO CORTICIS EXTERIORIS AURANTII HISPALENSIS, (P. L. 1788.) DITTO AURANTIORUM, (P. L. 1824.) DITTO AURANTII, (P. L. 1809 and 1836.) *Prep.* (P. L.) The external rind of the fresh orange, separated by rasping, lb. j; white sugar lb. iij. Beat the rind in a stone mortar with a wooden pestle, then add the powdered sugar, and beat the mixture until the two are perfectly incorporated.

Remarks. This confection is tonic and stomachic, and is principally used as a vehicle for the exhibition of tonic powders.

CONFECTION OF PEPPERMINT. *Prep.* Green peppermint 4 oz.; powdered white sugar 12 oz.; beat them together as last.

Use. Anti-emetic and flatulent. Given in colic, &c., in the form of a bolus, or made into a mixture.

CONFECTION OF THE DOG ROSE. *Syn.* CONFECTION OF HIPS. CONSERVA FRUCTUS CYNOSBATI, (P. L. 1720 and 1745.) DITTO CYNOSBATI, (P. L. 1788.) DITTO ROSÆ CANINÆ, (P. L. 1809, and since.) *Prep.* (P. L.) Pulp of the dog rose lb. j; powdered refined sugar ℥xx; mix by a gentle heat in an earthen vessel.

II. Pulped hips 2 cwt.; fine white sugar 2½ cwt.; incorporate them without applying heat.

Remarks. Both this and the following confection has a brighter color, if made without heat, or touching metallic vessels. On the small scale it is made by beating the ingredients together in a marble mortar, but in large quantities by grinding in a mill. It is slightly laxative, and is principally used for forming pills. It candies by keeping.

CONFECTION OF THE RED ROSE. *Syn.* CONSERVA ROSARUM RUBRARUM, (P. L. 1745.) DITTO ROSÆ, (P. L. 1788.) DITTO ROSÆ GALLICÆ, (P. L. 1809 and 1824.) CONFECTIO ROSÆ GALLICÆ, (P. L. 1836.) *Prep.* (P. L.) Petals of the red rose lb. j; refined sugar lb. iij; beat the petals in a stone mortar, then add the sugar, and again beat until thoroughly incorporated.

Remarks. On the large scale this is prepared like the confection of hips. It is astringent and tonic, and principally used for forming pills. If taken alone, the dose is 1 to 2 drachms.

CONFECTION OF RUE. *Syn.* ELECTUARIUM E BOCCIS LAURI, (P. L. 1720, 1745.) CONFECTIO RUTÆ, (P. L. 1809, and since.) *Prep.* (P. L.) Dried rue, caraway, and laurel berries, of each ℥iss; sagapenum (true) ℥ss; black pepper ʒij; honey ℥xvj. Reduce the dry ingredients to very fine powder, and when wanted for use, make them into a confection with the honey.

Use, &c. It is antispasmodic; in enemas 30 to

60 grs., with half a pint of gruel, for flatulent colic, &c.

CONFECTION OF SCAMMONY. *Syn.* ELECTUARIUM CARYOCOSTINUM, (P. L. 1720.) DITTO E SCAMMONIO, (P L. 1745.) DITTO SCAMMONII, (P. L. 1809 and 1788.) CONFECTIO SCAMMONEÆ, (P. L. 1809 and 1824.) *Prep.* (*Confectio Scammonii* P. L.) Scammony ℥iss; cloves and ginger, of each, ʒvj; oil of caraway fʒss. Reduce the ingredients to a very fine powder, and when wanted for use, make them into a confection with sirup of roses, and lastly add the oil.

Use, &c. Cathartic in doses of 10 to 30 grs.

CONFECTION OF SENNA. *Syn.* LENITIVE ELECTUARY. ELECTUARIUM SENNÆ, (P. L. 1788.) CONFECTIO SENNA, (P. L. 1809, and since.) *Prep.* (P. L.) Senna ℥viij; figs lb. j; pulp of tamarinds, prunes, and cassia, of each, lb. ss.; coriander seeds ℥iv; liquorice ℥iij; sugar lb. iiss; water 3 pints. *Proc.* Rub the senna and corianders in a mortar, and separate by sifting ℥x of the mixed powders. Boil the figs and liquorice in the water, until reduced to one half; then press and strain the liquor. Evaporate the strained liquor until only 24 fluid ounces remain, then add the sugar, and when dissolved, mix in the pulps, and lastly the powder.

Use, Dose, &c. Confection of senna is a gentle and pleasant purgative, and well adapted for persons suffering from piles, and as a laxative during pregnancy. The dose is ¼ to ½ oz. taken at bedtime or early in the morning.

Remarks. Perhaps there is no one pharmacopœial preparation which it is more difficult to obtain of good quality than the above. The absolute cost of an article prepared according to the directions of the College, will be somewhere about 1s. 9d. per lb.; but there are many wholesale drug houses vending confection of senna, which they warrant as genuine, at from 9*d.* to 1*s.* a pound. Dr. Paris (in his Pharmacologia) very truly remarks, that "the directions of the Pharmacopœia are very rarely followed." I understand that considerable quantities are manufactured, into which unsound and spoiled apples enter as a principal ingredient. The following forms are, to my knowledge, employed by some members of the trade.

II. Powdered senna, pulp of tamarinds, cassia, and prunes, of each, 1½ lb.; powdered corianders ¾ lb.; Spanish juice ½ lb.; simple sirup 12 lbs.

III. As the above, omitting the cassia pulp, and adding 2 lbs. more tamarind pulp.

Both these articles are labelled P. L., and sent out as genuine, and that when no competition as to price exists. The cheaper article is made as follows:

IV. Common prunes and tamarinds, of each, 16 lbs.; treacle ¾ cwt.; species (a compound of senna dust and small senna, mixed with 3 lbs. of coriander seeds, and strengthened with jalap, all ground to a fine powder) 18¾ lbs. To this is frequently added ¼ cwt. of rotten or inferior apples, which are pulped with the prunes and tamarinds. This article is not unfrequently labelled "CONF. SENNÆ VER." by the conscientious tradesman.

CONFECTION OF SULPHUR, (COMPOUND.) *Prep.* (St. B. H.) Precipitated sulphur ℥ss; cream of tartar ʒj; honey ℥j; mix As a laxative in piles, &c. *Dose.* ℥ss.

CONFECTION OF STEEL. *Syn.* CONFECTION OF CARBONATE OF IRON. *Prep.* Confection of orange-peel and sesquioxide of iron, (P. L.,) of each, 4 oz.; powdered white sugar 6 oz.; simple sirup 2 oz.; mix. Aromatic and tonic. *Dose.* A teaspoonful to ½ oz. twice or thrice daily.

CONGELATION, (from *congelo*, to freeze.) IN CHEMISTRY. The conversion of a liquid into a solid state, by the action of cold.

The production of an extreme degree of cold is often of the utmost importance in chemical operations, and an easy method of doing so is consequently a desideratum. The means hitherto adopted for this purpose have either depended upon the sudden liquefaction of solids, or the abstraction of heat by rapid evaporation. The loss of sensible heat, by the first method, is the basis of the various processes of producing cold by what are commonly called freezing mixtures, all of which act upon the principle of liquefying solid substances without supplying heat. The caloric of liquidity being in these cases derived from that previously existing in the solid itself in a sensible state, the temperature must necessarily fall. The degree of cold produced, depends upon the quantity of heat which is thus diffused through a larger mass, or which, as it were, disappears, and this is dependent on the quantity of solid matter liquefied, and the rapidity of the liquefaction. Saline compounds are the substances most frequently employed, and those which have the greatest affinity for water, and thus liquefy the most rapidly, produce the greatest degree of cold. Thus it is, that chloride of calcium and nitrate of ammonia, when dry and in fine powder, if suddenly mixed with water, produce extreme cold. The latter, suddenly mixed with an equal weight of water at 50°, will sink the thermometer to +4°, or 28° below the freezing point. The most common and convenient freezing mixture, when snow can be procured, is formed by mixing 2 parts of that substance with 1 part of sea-salt. This will sink the thermometer to —5°, or 37° below the freezing point of water. Equal parts of these substances produce a degree of cold marked by the zero of Fahrenheit's thermometer, and is the standard taken for graduating that instrument. Mr. Walker, a gentleman who fully investigated this subject, recommends the following proportions for the production of extreme cold.

TABLES *exhibiting a collective View of all the* FRIGORIFIC MIXTURES *contained in* MR. WALKER'S *Publication*, 1808.

TABLE I. Consisting of Frigorific Mixtures, composed of Ice, with Chemical Salts and Acids.

Mixtures	Parts	Thermometer sinks.	Degree of cold produced.
Snow or pounded ice	2 parts	From any temperature to —5°	*
Muriate of soda	1 "		
Snow or pounded ice	5 "	From any temperature to —12°	*
Muriate of soda	2 "		
Muriate of ammonia	1 "		
Snow or pounded ice	24 "	From any temperature to —18°	*
Muriate of soda	10 "		
Muriate of ammonia	5 "		
Nitrate of potash	5 "		
Snow or pounded ice	12 "	From any temperature to —25°	*
Muriate of soda	5 "		
Nitrate of ammonia	5 "		
Snow	3 "	From +32° to —23°	55°
Diluted sulphuric acid†	2 "		
Snow	8 "	From +32° to —27°	59
Muriatic acid (concentrated)	5 "		
Snow	7 "	From +32° to —30°	62
Concentrated nitrous acid	4 "		
Snow	4 "	From +32° to —40°	72
Muriate of lime	5 "		
Snow	2 "	From +32° to —50°	82
Crystallized muriate of lime	3 "		
Snow	3 "	From +32° to —51°	83
Potash	4 "		

N. B. The reason for the omissions in the last column of this table is, the thermometer sinking in these mixtures to the degree mentioned in the preceding column, and never lower, whatever may be the temperature of the materials at mixing.

TABLE II. Consisting of Frigorific Mixtures, having the power of generating or creating Cold, without the aid of Ice, sufficient for all useful and philosophical purposes, in any part of the world at any season.

Mixtures.	Parts	Thermometer sinks.	Degree of cold produced.
Muriate of ammonia	5 parts	From +50° to +10°	40°
Nitrate of potash	5 "		
Water	16 "		
Muriate of ammonia	5 "	From +50° to +4°	46
Nitrate of potash	5 "		
Sulphate of soda	8 "		
Water	16 "		
Nitrate of ammonia	1 "	From +50° to +4°	46
Water	1 "		
Nitrate of ammonia	1 "	From +50° to —7°	57
Carbonate of soda	1 "		
Water	1 "		
Sulphate of soda	3 "	From +50° to —3°	53
Diluted nitrous acid‡	2 "		
Sulphate of soda	6 "	From +50° to —10°	60
Muriate of ammonia	4 "		
Nitrate of potash	2 "		
Diluted nitrous acid	4 "		

† Strong acid 2 parts; water or snow 1 part, by weight.
‡ Fuming nitrous acid 2 parts; water 1 part, by weight.

Table II. continued.

Mixtures.	Thermometer sinks.	Degree of cold produced.
Sulphate of soda . . . . 6 parts Nitrate of ammonia . . . 5 " Diluted nitrous acid . . . 4 "	From +50° to —14°	64°
Phosphate of soda . . . 9 " Diluted nitrous acid . . . 4 "	From +50° to —12°	62
Phosphate of soda . . . 9 " Nitrate of ammonia . . . 6 " Diluted nitrous acid . . . 4 "	From +50° to —21°	71
Sulphate of soda . . . . 8 " Muriatic acid . . . . 5 "	From +50° to 0°	50
Sulphate of soda . . . . 5 " Diluted sulphuric acid* . . 4 "	From +50° to +3°	47

N. B. If the materials are mixed at a warmer temperature than that expressed in the Table, the effect will be proportionately greater; thus, if the most powerful of these mixtures be made when the air is +85°, it will sink the thermometer to +2°.

TABLE III. Consisting of Frigorific Mixtures selected from the foregoing Tables, and combined so as to increase or extend Cold to the extremest Degrees.

Mixtures.	Thermometer sinks.	Degree of cold produced.
Phosphate of soda . . . . 5 parts Nitrate of ammonia . . . 3 " Diluted nitrous acid . . . 4 "	From 0° to —34°	34°
Phosphate of soda . . . 3 " Nitrate of ammonia . . . 2 " Diluted mixed acids . . . 4 "	From —34° to —50°	16
Snow . . . . 3 " Diluted nitrous acid . . . 2 "	From 0° to —46°	46
Snow . . . . 8 " Diluted sulphuric acid . . . 3 " Diluted nitrous acid . . . 3 "	From —10° to —56°	46
Snow . . . . 1 " Diluted sulphuric acid . . . 1 "	From —20° to —60°	40
Snow . . . . 3 " Muriate of lime . . . . . 4 "	From +20° to —48°	68
Snow . . . . . . 3 " Muriate of lime . . 4 "	From +10° to —54°	64
Snow . . . . 2 " Muriate of lime . . . 3 "	From —15° to —68°	53
Snow . . . . 1 " Crystallized muriate of lime . . 2 "	From 0° to —66°	66
Snow . . . . 1 " Crystallized muriate of lime . . 3 "	From —40° to —73°	33
Snow . . . . 8 " Diluted sulphuric acid . . . 10 "	From —68° to —91°	23

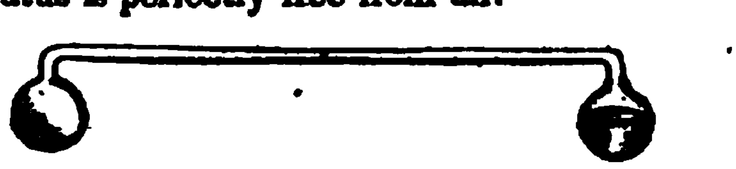
Remarks. The above artificial processes for the production of cold are more effective when the ingredients are first cooled by immersion in other freezing mixtures. In this way Mr. Walker succeeded in producing a cold equal to 100° below the zero of Fahrenheit, or 132° below the freezing point of water.

The materials in the first column are to be cooled, previously to mixing, to the temperature required, by mixtures taken from either of the preceding tables.

* Equal weights of strong acid and water.

II. (*By evaporation.*) When heat passes from the sensible to the insensible state, as in the formation of vapor, cold is generated. This may be illustrated by pouring a few drops of ether, or highly rectified alcohol, on the palm of the hand, when a strong sensation of cold will be produced. In like manner, if the bulb of a thermometer be covered with lint, and the latter moistened with ether, the quicksilver will rapidly fall. Even in hot climates water is frozen by the joint operation of evaporation and radiation. The natives of India procure ice when the temperature of the air much exceeds the freezing point. On the open plains, near Calcutta, this is effected by exposing a thin stratum of water to the atmosphere, during the fine clear nights of December, January, and February. The pans are made of porous earthenware, and water is poured in to the depth of about $1\frac{1}{2}$ inches. A large number of vessels of this kind are arranged in an excavation in the ground, 30 or 40 feet square and 2 feet deep, the bottom of which is covered, to the depth of 10 or 12 inches, with sugar canes or the stalks of Indian corn. At sunrise the pans are visited, the ice separated from the water, and packed as tight as possible in a deep cavity or pit, well screened from the heat.

It has been found that evaporation proceeds much more rapidly from the surface of fluids in a vacuum than in the atmosphere. Dr. Cullen was the first person to apply this practically. In 1755 he plunged a vial of ether into a tumbler of water, and on placing it under a receiver and exhausting the air, the ether boiled and the water was speedily frozen. In 1777, Mr. Nairne published his method of rendering the rarefied atmosphere of an exhausted receiver free from aqueous vapor by means of sulphuric acid. By the application of this discovery, Professor Leslie in 1810 succeeded in freezing water with great ease. This he effected by introducing a surface of sulphuric acid under the receiver of an air-pump, over which he placed a watch-glass filled with water, so that the vapor arising from the latter was rapidly absorbed by the former. After a few strokes of the piston the water was converted into a solid cake of ice, which on being left in the rarefied medium continued to evaporate, and in about an hour totally disappeared. Professor Leslie found that when the air was rarefied 250 times, the surface of evaporation was cooled down 120° in winter, and when only 50 times, a depression of 80° or even 100° took place. A pleasing philosophical toy, illustrative of the evaporative power of a vacuum, is the Cryophorus, or frost-bearer of Dr. Wollaston. This instrument consists of two small glass globes united by a tube, one of which is partly filled with water, but the apparatus is perfectly free from air.



The part of the apparatus unoccupied by the water, though apparently empty, is in reality filled with aqueous vapor, and thus checks evaporation by its pressure on the surface of the water. No sooner is the pressure removed, as by plunging the empty ball into a freezing mixture, (which condenses the vapor,) than rapid evaporation commences, and the water in the other ball is frozen in two or three minutes.

To succeed well in the production of cold in this way, it is necessary that the surfaces of the two fluids should be pretty near together, and that the acid should have the greater amount of surface of the two. The acid should be poured to the depth of $\frac{1}{2}$ an inch into a broad shallow dish or capsule, and the water into another vessel of a similar kind, but having only half the diameter of the former, and proportionally shallow. The smaller capsule may be supported over the surface of the larger one by means of 3 slender feet. As soon as the acid has acquired one-tenth of its weight of water, its absorbent power is diminished $\frac{1}{100}$; when this dilution reaches $\frac{1}{4}$ the reduction is $\frac{1}{20}$, and when it reaches $\frac{1}{2}$ the cooling power has diminished about 50%. "Sulphuric acid is capable of congealing more than 20 times its weight of water before it has imbibed nearly its own bulk of that liquid, or has lost about $\frac{1}{8}$ of its refrigerating power." (Ure.) Sulphuric acid, which has become diluted in this way, may be reconcentrated by heat.

It has been discovered that oatmeal, dried nearly to brownness before a common fire, and cooled in close vessels, may be substituted for sulphuric acid. With a quantity of this substance, one foot diameter, and 1 inch deep, Professor Leslie froze 1 imperial pint of water, contained in a hemispherical porous cup. Ignited chloride of calcium, in porous pieces, has also been successfully used for the same purpose. Dr. Ure has found that a requisite vacuum may be produced by the agency of steam, in the following manner, without the use of an air-pump: "A cast-iron drum of considerable dimensions being filled with steam by heating a small quantity of water in it, will sufficiently expel the air. When it is cooled by the affusion of water, a transferrer plate being attached to the stopcock on its upper surface would easily enable us, without any air-pump, to effect congelation by means of sulphuric acid in the attenuated atmosphere. Suppose the capacity of the receiver to be one-sixtieth of the iron cylinder, an aëriform rarefaction to this degree would be effected in a moment by a turn of the stopcock; and, on its being returned, the moisture below would be cut off, and the acid would speedily condense the small quantity of vapor which had ascended."

Many curious experiments may be performed over sulphuric acid, in the receiver of an air-pump, among which one of the most instructive and amusing is the congelation of quicksilver, a metal which requires, for this purpose, a temperature of 39° below zero, or 71° below the freezing point of water. This is readily effected by suspending the metal in a capsule of ice by means of threads, near to the surface of the sulphuric acid, and urging the rarefaction as much as possible. Mercury so frozen may be kept in the solid state for several hours.

The processes of congelation above detailed admit of being applied to several useful purposes, especially in domestic economy, and the arts of the cook and confectioner, as in the making of ices, &c.

CONGREVE MATCHES. I. (*Process of M. Joblonouski.*) Put phosphorus 40 grammes into a wide-mouthed vial, with enough oil of turpentine to cover it, add flowers of sulphur 10 gr.,

and put the vial into hot water, (using great caution,) until the phosphorus is melted. Then cork close and agitate until cold, when any supernatant spirits of turpentine must be poured off. Into this pulpy mass the extremities of the matches are dipped, and when they have become *rather* dry, they are again dipped into the following mixture: Gum arabic 30 grammes, (dissolved in a little water;) chlorate of potassa 20 grammes; soot, or vermilion, (rubbed up with a few drops of alcohol,) 10 gr.; mix, and dip the tips of the matches therein as before, then dry them cautiously in a warm apartment. These matches inflame without fulmination (noise) on being rubbed against any rough surface.

II. (*Joblonouski.*) Chlorate of potassa 2 parts; phosphorus 4 parts; gum arabic 7 parts; gelatin 2 parts. *Proc.* The phosphorus is divided in the gum brought to the state of thick mucilage, and warmed; the gelatin is melted and added to the phosphoreted mucilage. The chlorate of potassa is bruised in a mortar, and at the same time moistened with the mucilage. When it is bruised the whole is mixed together, and a paste is obtained, with which matches, tipped with sulphur, may be embued. They are then dried in the air.

III. (*Process of Dr. R. Boettger.*) Gum arabic and vermilion, of each 16 parts; phosphorus 9 parts; saltpetre 14 parts. *Proc.* The phosphorus must be reduced to a state of fine division, by agitating it with fresh urine, or, still better, a solution of pure urea, which, in consequence of the discovery by Liebig, of a process of preparing that substance artificially, may now be easily procured or made. Hot water must be employed to melt the phosphorus, and this part of the process is similar to that previously detailed. The minutely divided phosphorus thus formed, is mixed with the other articles made into a paste, with the gum dissolved in the least quantity of water, and the matches dipped into the mingled ingredients and dried. They are then dipped into a dilute varnish of copal, or a thin solution of gum arabic containing saltpetre, and again dried. (Boettger's Beitrage.) These matches are very superior, and explode without noise.

Remarks. The matches formerly made, exploded with a crackling noise, and frequently threw out small sparks of fire, which rendered them dangerous. This arose from their containing too large a quantity of chlorate of potassa. An opposite plan is now generally followed, and a less proportion of the chlorate is used, or instead thereof saltpetre. The quantity of the igniting ingredients has also been greatly lessened, so as to avoid any danger on that account. This plan answers very well, when the body of the matches, whether of wood or pasteboard, is properly prepared; but if this be not the case, frequent disappointment will occur, from their going out again immediately after inflaming. To prevent this, the matches should be dipped into sulphur previously to coating them with the composition, unless intended for cigar fusees, when they should be prepared by soaking them in water holding some saltpetre, bichromate of potash, or acetate of lead in solution, preference being usually given to the first of these articles. Different coloring substances are employed to tint the composition, according to the fancy of the manufacturer, as smalts, red lead, vermilion, black oxide of manganese, soot, &c. A very elegant method of reducing phosphorus to a state of minute division, is to melt it in rectified spirit, and agitate until cold, as above.

The manufacture and sale of matches, containing sulphur and phosphorus, as in the first formula, have been forbidden in Paris, in consequence of the extreme facility with which they ignite, having led to several accidents. (See CHLORATE MATCHES, and LUCIFERS.)

CONIA. *Syn.* CONEINE. CONICIN. CICUTINE, &c. A poisonous alkaloid, discovered by Giesoke in hemlock.

Prep. Distil the seeds of hemlock, or their alcoholic extract, with water and potassa. During this process, the conia passes over into the receiver and floats upon the top of the water, which also contains a little conia in solution. It must be purified in the way directed for the volatile bases. (See ALKALOID.) If the alcoholic extract be employed, about ½ its weight of potassa should be used.

Remarks. 6 lbs. of fresh and 9 lbs. of dried seeds yielded 1 oz. of conia. (Gieger.) 40 lbs. of the ripe but green seeds yielded 2½ oz. of hydrated conia. (Christison.) It is remarkably poisonous. One drop, placed in the eye of a rabbit, killed it in 9 minutes. Five drops, poured into the throat of a dog, killed it in less than a minute. It has been employed in some convulsive and spasmodic diseases. "The plaintive cries, the contortions, and the rigidity of the limbs, which have always preceded death, (caused by conia,) leave no doubt as to the cruel pains which this kind of poisoning brings on." (Boutron-Chalard and Henry.)

CONSERVES. (From *conservo*, to keep.) In pharmacy, a composition of some recent vegetable matter and sugar, beat together to the consistence of a paste. The object aimed at in the preparation of conserves, is to preserve the properties of the active ingredient, which would otherwise be liable to change. In the last edition of the London Pharmacopœia, conserves, as well as electuaries, are included under the head of confections. The term confection appears, however, less appropriate to some of them, than the word conserve or electuary. The word confection has a more general application, and implies any sweetmeat or composition, in which sugar is the principal ingredient.

CONSERVE OF ALMONDS. (CONSERVA AMYGDALARUM, P. D.) Confection of almonds.

CONSERVE, ANTISCORBUTIC. (CONSERVA ANTISCORBUTICA. Selle.) Horseradish, water-cress, water-trefoil, radish juice, and orange juice, of each equal parts; white sugar enough to make a confection.

CONSERVE OF ARUM. (WAKEROBIN.) *Prep.* Fresh arum roots ½ lb.; white sugar 1½ lb.; beat together. Diuretic and attenuant.

CONSERVE OF LAVENDER. *Prep.* Lavender flowers 1 part; lump sugar 3 parts; beat together.

Remarks. In a similar way conserves are made from various other leaves and flowers; but mostly with only twice their weight of sugar. The above is frequently used to sweeten the breath.

CONSERVE OF LEMON-PEEL. *Prep* Rasp off the external rind of the lemon, and beat

it in a mortar with three times its weight of powdered white sugar. (See CONFECTION OF ORANGE-PEEL.) Tonic and stomachic.

CONSERVE OF ORANGE-PEEL. (CONSERVA AURANTII, P. E.) The same as the confection of orange-peel, P. L.

CONSERVE OF RED ROSES. (CONSERVA ROSÆ, P. E. and D.) That of the Dublin Pharmacopœia is the same as the confection of roses, P. L.; that of the Edinburgh has only 2 lbs. of sugar to 1 lb. of rose petals.

CONSERVE OF ROSEMARY. *Prep.* 1 part of the leaves or tops, beaten up with 3 parts of sugar.

CONSERVE OF SCURVY GRASS. *Syn.* CONSERVA COCHLEARIÆ HORTENSIS. *Prep.* Beat 1 lb. of the leaves with 3 lbs. of lump sugar. Stimulant and antiscorbutic.

CONSERVE OF SLOES. *Syn.* CONSERVA PRUNI SYLVESTRIS, (P. L. 1788.) Pulp of sloes 1 part; sugar 3 parts; mix.

CONSERVE OF SQUILLS. *Syn.* CONSERVA SCILLÆ, (P. L. 1788.) Fresh squills ℨj; white sugar ℨv; mix. Diuretic; attenuant.

CONSERVE OF TAMARINDS. *Syn.* CONSERVA TAMARINDORUM. *Prep.* (P. Cod.) Pulp of tamarinds 4 oz.; white sugar 6 oz.; heat by a water-bath in an earthen vessel, until mixed and of a due consistence.

CONSERVE OF WORMWOOD. *Syn.* CONSERVA ABSINTHII MARITIMI, (P. L. 1788.) *Prep.* Beat fresh-picked leaves of sea wormwood in a marble mortar, with a wooden pestle, first alone, and then with 3 times their weight of refined sugar.

CONSTIPATION, (OF THE BOWELS.) Costiveness. When this is merely accidental or occasional, a dose of some cathartic is the only treatment necessary, but when it is *habitual*, it calls for further attention. The common causes of constipation are—The use of bread containing alum, and water containing lime; and the want of sufficient exercise. The treatment should consist in adopting a diet free from astringents, and consisting of a large portion of green vegetables and ripe fruit. Brown bread is frequently eaten for this purpose, and acts by the laxative nature of the bran it contains. The *occasional* use of laxative and emollient enemata may be had recourse to, but their habitual administration, as well as that of purgative medicines, by the mouth, is not to be recommended. The bowels, accustomed to the continual use of stimulants, act but languidly, or scarcely at all, without their application. In females, especially of the higher classes, the want of proper exercise is generally the chief cause of constipation. With such persons, a short walk two or three times daily will often do wonders, particularly if a little ripe fruit, a few raisins or tamarinds, or 2 or 3 drum figs, be occasionally eaten.

COPAIBA. *Syn.* CAPIVI. BALSAM OF CAPIVI. The best copaiba is that imported from Maracaibo and St. Martha, and is packed in casks containing from 1 to 1½ cwt. each, in large bottles, or in cylindrical tin boxes. Considerable variation exists in the color, consistence, and sp. gr., as well as in the proportion of oil and resin yielded by different samples, scarcely any two of which exactly agree. Even the odor, taste, and transparency vary considerably. Brazilian capivi is thin, clear, and pale; while the West Indian is thick, golden yellow, less transparent, and has a less agreeable and somewhat terebinthinate smell. Some varieties are opaque, and continue so, unless filtered. This is a most troublesome operation, unless well managed, and without proper precautions, frequently proves useless. The opacity generally arises from the presence of water, which is frequently found mixed with copaiba when first imported. This it retains with great tenacity. The following is the plan I have found to answer on the large scale. Place the casks upon their ends in a warm situation, and leave them so for a fortnight, or longer, if convenient. They may then be tapped *a little above the bottom*, when some of them will generally be found quite transparent, and may be drawn off and vatted, care being taken to avoid shaking up the bottom. Those that are foul must be filtered through one or more long Canton flannel bags, sunk in the bottom of a tin cistern, placed over a suitable receiver; a few pounds of coarsely-powdered charcoal being mixed up with the first 5 or 6 gallons thrown in. This will rapidly fill up the pores of the bag, and make the balsam flow clear and pale. The first runnings should be returned until it becomes perfectly transparent. The bottoms of the casks, containing the water or impurities, may be poured into a large can or jar, and allowed to deposite for a few days, when the copaiba may be poured off the top, and filtered. A sudden change of temperature will frequently turn a brilliant sample of this article opaque or milky; it is not, therefore, deemed fit to send out by the wholesale trade, unless it will "*stand*" this test. To ascertain this point, a common practice is to fill a small bottle with the copaiba, and to leave it out of doors all night in an exposed situation. (See also BALSAM OF COPAIBA.)

COPAIBA, ALKALINE TINCTURE OF. (LEWIS THOMPSON.) *Prep.* Dissolve 2 oz. of carbonate (formerly subcarbonate) of potassa in 1 pint of water, and add to this, balsam of copaiba in a thin stream, constantly stirring the mixture, until this, at first white and milky, becomes clear like jelly or amber, which will generally take place when about a pint of balsam has been added; set the mixture aside for two or three hours, then pour in two pints of spirit of wine, and mix the whole together; the solution is then fit for use, and may be flavored with any of the essential oils. Sweet spirit of nitre may be substituted for spirit of wine; but it is necessary to destroy its acidity by distillation from lime or potassa, otherwise a decomposition will take place.

This solution is compatible with iodide of potassium and nitrate of potassa, but is decomposed by all earthy, metallic, and ammoniacal salts, such as sulphate of magnesia, chloride of iron, acetate of ammonia, &c., which must not, therefore, be administered in conjunction with it. (Chemist, iv 510.)

COPAIBA AND KALI. *Prep.* Carbonate of potassa and water, of each equal parts; dissolve, and add gradually transparent balsam of copaiba until the fluid, at first milky, turns quite clear

COPAIBA CAPSULES. Gelatinous capsules filled with balsam of copaiba.

COPAIBA AND RHATANY, CAPSULES OF. Ricord has recommended capsules of copaiba, coated with extract of rhatany, as much superior to the common ones of copaiba alone, in the treatment of blenorrhœa. They may be easily prepared by either of the two following methods:

1. By immersing, for an instant, the common capsule in the following composition: or,
2. By forming the bodies of the capsules with the *composition*, instead of with *gelatin*, and following the same manipulations as for the manufacture of the common gelatin capsules.

The Rhatany Composition. Extract of rhatany, newly prepared from the root, 3 parts; sirup of moist sugar 1 part; mucilage of gum arabic 1 part. Melt the extract and reduce it in a water bath until sufficiently stiff, when cold; do the same with the sirup and gum; then mix them together while hot, but only in such quantity as may be used at one time.

These capsules are said to sit well upon the stomach, the tone of which they contribute to improve.

COPAIBA, MISCIBLE. *Prep.* Mix transparent balsam of copaiba with half its volume of liquor of potassa of double strength.

Remarks. Different samples of balsam often require *slightly* different quantities of the solution of potassa; it is therefore best to mix them gradually and cautiously together. Should the mixture be opaque, a *little* more, of one or other of the ingredients, as the case may be, will render it clear. No heat should be used. This article is miscible with water, with which it forms a kind of milk; and from containing *all* the volatile oil of the copaiba is a very valuable preparation. Its activity is considered equal to the balsam itself, and it is given in similar doses.

COPAIBA, MIXTURE OF. (CHOPART.) *Prep.* Copaiba, alcohol, sirup of Tolu, peppermint water, orange-flower water, of each ℥ij; sweet spirits of nitre ʒij. *Proc.* Rub the copaiba with the sirup until perfectly mixed, then add the spirits, and lastly the waters.

COPAIBA, SOLUBLE. *Prep.* I. Heat miscible copaiba to the boiling point, pour it while hot into a "*separator*," and place it in some situation where it will cool slowly. After a few days draw off the clear portion from a cock or hole placed *near* the bottom of the vessel, observing to stop the stream before any of the floating oil begins to flow through. *A very little* concentrated liquor of potassa added before applying the heat, will render it more soluble. *Prod.* Thick, clear, and soluble in *pure* water. Resembles copaiba in appearance.

II. Agitate balsam of copaiba with an equal measure of liquor of potassa, (P. L.;) boil for a few minutes in a clean tinned copper pan, then pour it into a separator, and proceed as before. Thinner than the last.

COPAIBA, SPECIFIC SOLUTION OF. (FRANK'S.) *Prep.* I. Balsam of copaiba 2 parts; liquor of potassa (P. L.) 3 parts; water 7 parts; boil it for 2 or 3 minutes, put it into a separator, and allow it to stand for 5 or 6 days, then draw it off from the bottom, avoiding the upper stratum of oil. To the clear liquid add 1 part of sweet spirits of nitre, perfectly free from acid, to which a few drops of liquor of potassa has been added, until it slightly browns turmeric paper; should it turn foul or milky, a *very little* liquor of potassa will usually brighten it; if not, place it in a clean separator for a few days, and draw it off from the bottom as before, when it will be perfectly brilliant without filtering.

Remarks. Some persons add the sweet spirits of nitre while the solution is still hot, mix it in as rapidly as possible, and immediately cork or fasten up the vessel. This is a good way when the article is wanted in a hurry, but is objectionable from the loss of spirit thereby occasioned, and the danger, without care, of bursting the separator.

A receipt for this article, upon the authority of Battley, has been going the round of the pharmaceutical works for some years, but which produces a preparation not at all resembling "*Frank's specific solution.*" It is as follows: "Take 12 oz. of balsam of copaiba and 6 oz. of calcined magnesia; rub together, add a pint of proof spirit, filter, and then add ½ oz. of sweet spirits of nitre." (Gray's Supplement.) I have tried this formula, and I find the product to be a white tincture, scarcely flavored with copaiba, and perfectly limpid. No sooner is balsam of copaiba mixed with half its weight of magnesia, than the two unite, and produce a compound insoluble in spirit of wine. Such is the affinity of this earth for copaiba, (copaibic acid,) that it will even take it from caustic potassa. Thus I find the solution of this balsam, (containing potassa,) if filtered through blotting-paper, with a little magnesia, becomes so strongly alkaline as to materially injure its quality, while a glutinous mass is deposited upon the sides and bottom of the paper. I have been led to a notice of this subject, from well knowing that many druggists have adopted this formula, and have been disappointed with the results, which are, however, only such as might be reasonably anticipated.

COPAIBA, SALT OF. *Syn.* SAL COPAIBÆ. There are two preparations bearing this name, the one, copaibic acid, and the other, copaibate of an alkali. They are both sold at ridiculously high prices. The advertisement of one of these preparations is heralded in with the following pseudo-philosophical announcement:

"*This preparation* of copaiba, in its chemical and medical analogies, may be compared to quinine from bark, the former being the tonic of the mucous membranes, and the latter that of the dermoid structures.

"*This salt* contains all the properties of the balsam of copaiba in a very concentrated form, without its nauseating qualities, and from this circumstance it may be administered to the most delicate constitution."

It is the general opinion of medical men, that the active properties of copaiba reside in a volatile or essential oil, of which the *above preparation* is *destitute.* It is therefore difficult to conceive how, in *this* instance, the reverse should be the case. I can speak from my own experience, and that of several high authorities to whom I have referred, that both the viscid and acid resins of copaiba are almost inert, and that all the alkaline preparations of these substances are nearly similar. I have taken the "sal copaibæ" myself, and have watched its action on others, but have not been able to

perceive any good effects to result from its administration.

COPAIBIC ACID. *Syn.* CAPIVIC ACID. The yellow brittle resin of balsam of copaiba. It is prepared by digesting the resin (left after distilling the oil from the balsam) in alcohol, which dissolves the acid resin, but leaves the viscid one. It may be purified by re-solution in alcohol. It forms about 50§ of the balsam.

Prop. An amber-colored, brittle, semi-crystalline, resinous substance, soluble in alcohol, ether, and oils, reddens litmus paper, and forms salts with the bases, called copaivates. These may generally be made by dropping into a solution of the acid in alcohol, an alcoholic solution of a soluble salt of the base. The copaivates of potash, soda, and ammonia are easily prepared, by adding to an alcoholic solution of the acid another of the pure alkali, until it be neutralized, when the salts may be obtained by careful evaporation. Copaivate of silver is formed by neutralizing the acid with nitrate of silver, both being dissolved in alcohol, and then adding a little liquor of ammonia, when a white crystalline precipitate will subside. The copaivates of lead, lime, and iron, as well as several others, may be made in a similar manner.

Copaivate of magnesia may be made by adding copaivate of potassa to a solution of epsom salts. All these salts are easily decomposed by acids.

COPAL. *Syn.* GUM COPAL. A resinous substance, which exudes spontaneously from the Rhus copallinum, and the Elæocarpus copalifer. When of good quality, it is too hard to be scratched by the nail, and has a conchoidal fracture. It dissolves with difficulty, and this, combined with its extreme hardness, renders it very valuable for making varnishes.

SOLVENTS. I. *Caoutchoucine;* sparingly. II. Equal parts of *caoutchoucine* and *alcohol*, of ·825; freely soluble in the cold. III. *Absolute alcohol*, added gradually to the copal, previously rendered gelatinous by water of ammonia, assisting the union with heat. IV. *Alcohol* added to the copal, previously softened with ether. V. *Absolute alcohol* 1½ parts, digested on copal 1 part for 24 hours. (Unverdorben.) VI. *Alcohol*, to which a little camphor has been added. VII. *Ether;* and this solution may be diluted with alcohol. VIII. *Oils of rosemary* and *lavender*, (spike;) too expensive for general use. IX. *Copal*, heated until it fuses, acquires the property of dissolving in turpentine and alcohol. X. *Copal*, reduced to powder and exposed for some time to the air, also becomes soluble in alcohol and turpentine. XI. *Drying linseed oil*, at nearly the boiling point, dissolves copal, and will bear dilution with spirits of turpentine as soon as it has cooled sufficiently. This is the common way of making copal varnish. XII. *Ammonia* enables oil of turpentine to dissolve copal; but it requires such nice management of the fire, that it seldom succeeds completely. (Lewis.) XIII. *Powdered copal*, triturated with a little camphor, softens and becomes a coherent mass; and camphor, added either to alcohol or oil of turpentine, renders it a solvent of copal. ½ oz. of camphor is sufficient for 1 quart of oil of turpentine, which should be of the best quality; and the copal, about the size of a large walnut, should be broken into very small pieces, but not reduced to a fine powder. The mixture should be set on a fire so brisk as to make it boil almost immediately The vessel should be of tin or other metal, strong, shaped like a wine-bottle with a long neck, and capable of holding 2 quarts. The mouth should be stopped with a cork, in which a notch is cut to prevent the vessel from bursting. (Sheldrake.) XIV. A good varnish may be made by pouring upon the purest lumps of copal, reduced to a fine mass in a mortar, colorless spirits of turpentine, to about one third higher than the copal, and triturating the mixture occasionally in the course of the day. Next morning it may be poured off into a bottle for use. Successive portions of oil of turpentine may thus be worked with the same copal mass. (Varley, Tilloch's Mag. 51.)

⁎ In all the above cases the copal should be reduced to a *coarse* powder. A *fine* powder is apt to stick together and form hard lumps. The solution of copal, even in its most ready solvents, is attended with some difficulty, and frequently miscarries in the hands of the inexperienced. A mixture of caoutchoucine and alcohol (as in No. II.) is an exception.

COPAL, MELTED. Obtained by holding the gum before a good fire, so that as soon as the copal melts, it may drop into a pan of water: a kind of oil separates from it, and the copal becomes soluble in spirits of wine, and still more so if the melting is repeated.

COPAL, POWDERED. Copal reduced to powder and exposed to the air in a thin stratum, on sieves covered with paper, for 3 or 4 months. Soluble in alcohol.

COPPER. (From *cuprum*, a corruption of *κύπρος*, from the island of Cyprus, whence it was formerly brought.) A red-colored metal, too well known to require description.

Hist. Copper and its alloys appear to have been known to the most remote ages of antiquity. Brass, an alloy of copper, is mentioned by Moses (Job, xxviii.) upwards of 1600 years before the birth of Christ. (Hales.) This metal is found in the metallic state, and in combination with oxygen, sulphur, acids, and other minerals, and in the organic kingdom, in the ashes of plants, and in the blood of animals. (Sarzeau.) The copper of commerce is principally prepared from copper pyrites, a mixed sulphuret of iron and copper, found in Cornwall, and other parts of the world.

Prep. Copper is only prepared from its ores on the large scale. The copper pyrites is first roasted, and then smelted, by which process "*coarse metal*" is produced; this is again submitted to calcination and smelting, when "*fine metal*" is obtained. It afterwards undergoes the process of refining and toughening.

Prop. This metal is malleable and ductile. It has a specific gravity of 8·8 to 8·9, fuses at about 2000° Fahr., and volatilizes at higher temperatures. It forms numerous compounds, all of which are more or less poisonous.

Char. and Tests. The solutions of copper possess a blue or green color, and yield a blue precipitate with soda or potassa. Ammonia produces a bluish-white precipitate, soluble in an excess of the precipitant, forming a deep blue solution. Prussiate of potash gives a reddish-brown precipitate, sulphureted hydrogen and hydrosulphurets, a black

III. (*Dr. Bailey's mixture.*) Epsom salts 3 dr.; infusion of roses ½ pint; tincture of cascarilla ½ oz. *Dose.* 2 or 3 tablespoonfuls at noon and in the evening.

IV. (*Dr. Gregory's mixture.*) Carbonate of potassa ½ oz.; cinnamon water and distilled water, of each 6 oz.; compound tincture of gentian 1 oz.; mix. *Dose.* As last.

V. (Dr. J. Hutchinson.) Quicklime ½ oz., slaked, by sprinkling on it a *little* water, and when it has fallen to powder, add water 1½ pint, and bruised cinchona bark 1 oz.; macerate with occasional agitation for 3 hours, in a covered vessel, then decant the clear liquor, and further add tincture of cinchona bark 2 oz.; sweet spirits of nitre 3 drs.; sirup of orange-peel 1 oz.; mix well, and keep it in a corked bottle. *Dose.* A wineglassful 2 or 3 times a day, accompanying its use with an occasional dose of a saline aperient. "Such were the renovating effects of this medicine on me, that it may with truth be denominated the true *aqua vita*; for it laid the foundation of a state of health and strength which has seldom been surpassed." (Sir J. Jervis, Bart.)

VI. (*Dr. Reece's mixture.*) Carbonate of soda 1 dr.; compound tincture of rhatany 1 oz.; tinctures of ginger and chamomiles, of each 3 dr.; camphor julep 7 oz.; mix. *Dose.* 3 tablespoonfuls twice a day. (See DYSPEPSIA.)

INDIGO. *Syn.* ANIL. BLEU D'INDE; INDIGO, (*Fr.*) INDICUM; PIGMENTUM INDICUM, (*Lat.*) Ἰνδικόν, (*Gr.*) A blue substance obtained from the leaves and young shoots of several species of indigofera and nerium, by soaking them either in cold water, or, still better, in water kept warm, and at about 106° Fahr., till the liquor becomes deep green; it is then drawn off, and beat or churned till blue flakes appear, lime-water is next added, the yellow liquor drawn off, the blue sediment dried, and formed into small lumps. Used as a blue dye and pigment, and occasionally in medicine for epilepsy.

Indigo, though apparently a very simple substance, is composed of several distinct principles, and by the action of acids, alkalis, oxygen, chlorine, &c., yields other substances possessing considerable interest. The following are the chief of these compounds, of which the word indigo constitutes a portion of the name:—

Pure indigo, or *indigo blue.* I. Powdered indigo 5 parts; green vitriol 10 parts; hydrate of lime 15 parts; water 60 parts; mix, agitate occasionally until the color is destroyed, then decant the clear portion, precipitate with hydrochloric acid, and wash the powder, first with water, and then with boiling alcohol, until the latter ceases to acquire a yellow color.

II. Caustic soda and grape sugar, of each 1 part; water 20 parts; powdered indigo 5 parts; mix, and proceed as above.

III. (Thos. Taylor.) Powdered indigo 2 parts; plaster of Paris 1 part; water, sufficient to reduce the mixture to a thin paste; spread the mass evenly upon an oblong iron plate to the depth of ⅛ inch, and dry it by a gentle heat. It must then be held over the flame of a spirit lamp, when a disgusting odor will be evolved, the mass will begin to smoke, and in a few minutes will be covered with a dense purple vapor, which will condense into brilliant flattened prisms or plates of an intense copper color, forming a thick velvety coating over the surface immediately exposed to the heat; should the mass catch fire, it may instantly be extinguished by a drop of water let fall upon it. *Prod.* 15 to 18%.

IV. (Fritsche.) Indigo and grape sugar, of each 1 part; put them into a bottle capable of holding 40 parts of liquid; half fill the bottle with boiling alcohol, and the other half with alcohol holding 1½ part of a very concentrated lye of caustic soda in solution, agitate well, and, after repose, decant the clear. The liquid thus obtained possesses an intense yellowish red color, but quickly passes, by exposure to the air, through the various shades of red, violet, and blue, at the same time depositing indigo blue, in scales. These must be well washed, first in alcohol, and lastly in water. *Product.* More than 50% of the indigo employed. This offers the easiest and most correct means of testing commercial indigo, and is well calculated, from its simplicity, for the use of dyers.

Indigogen, indigotine, indigo white, or *reduced indigo. Prep.* The yellow alkaline solution obtained by one of the above processes is carefully protected from the air, both before and after precipitation with muriatic acid; and the precipitate, after being rapidly washed with recently boiled distilled water, or with dilute sulphurous acid, is drained on a filter, and dried *in vacuo.* The product consists of a grayish mass of minute crystals, generally light-blue on the surface, and rapidly turning blue on exposure to the air. *White indigo* is soluble in alkalis, alcohol, and ether, to which it imparts a yellow color. These solutions deposite indigo blue on exposure to the air.

Indigo gluten is obtained by the action of dilute acids on indigo. It possesses little interest.

Indigo brown is obtained from powdered indigo by treating it first with dilute acid, and then with a hot strong caustic lye, which must afterwards be neutralized with acetic acid, evaporated to dryness, and treated with alcohol, to dissolve out acetate of potassa. A dark brown substance resembling humic acid.

Indigo red is obtained by boiling alcohol on powdered indigo exhausted of the two previous substances, by dilute acids and strong alkaline lyes. When heated, indigo red is converted into a white sublimate, (deoxydized indigo red,) but recovers its color by the action of nitric acid. This substance has also been called the RED RESIN OF INDIGO.

Indigo purple or phenecine, the purple precipitate obtained by filtration from a solution of indigo in fuming sulphuric acid, when largely diluted with water.

INDIGO DYES. There are two methods of preparing solutions of indigo for dyeing. 1. By deoxydizing it and dissolving it in alkaline menstrua. 2. By dissolving it in sulphuric acid. The former constitutes the ordinary *indigo vat* of the dyers.

Prep. I. *a.* (*Cold vat.*) Finely-powdered indigo 1 lb.; green copperas (as free as possible from red oxide) 2½ to 3 lbs.; newly-slaked quicklime 3½ to 4 lbs.; triturate the powdered indigo with a little water or an alkaline lye, then mix it

COPPER GREEN. *Syn.* Oxy-chloride of Copper. Bremen Green. Brunswick ditto. Friezland ditto. *Prep* Pour a saturated solution of muriate of ammonia over copper filings or shreds in a close vessel, keeping the mixture in a warm place, and adding more of the solution from time to time, till 3 parts of muriate and 2 of copper have been used. After standing a few weeks, the pigment is to be separated from the unoxidized copper, by washing through a sieve; and then it is to be well washed, and dried slowly in the shade. This green is almost always adulterated with ceruse, which improves the color.

Remarks. A mixture of cream-tartrate, or carbonate of copper, with carbonate of lime and magnesia, is also sold under the name of Brunswick green.

COPPER, IN FINE POWDER. *Prep.* A solution of sulphate of copper is heated to the boiling-point, and precipitated with distilled zinc. The precipitated copper is then separated from the adherent zinc by diluted sulphuric acid, and dried by exposure to a moderate temperature. From recently precipitated chloride of silver, an exceedingly fine silver-dust may also be obtained by boiling it with water, acidulated with sulphuric acid and zinc. (Boettger's Beitrage.)

COPPER, IODIDE OF. I. (*Iodide.*) When iodide of potassium is added to a solution of a salt of copper, a diniodide of copper falls down, and an iodide remains in solution. It is but little known.

II. (*Diniodide.*) To a solution of 4 parts of protosulphate of copper, and 5 parts of protosulphate of iron, add a solution of iodide of potassium, wash and dry the precipitate.

Remarks. The last preparation is that commonly known in trade by the name of iodide of copper.

COPPER, OXIDES OF. I. (*Black Oxide. Syn. Protoxide of Copper.*) *Prep.* This may be formed by calcining metallic copper, nitrate of copper, or the hydrate, thrown down from solutions of the salts of copper by means of pure potassa. This preparation was formerly called the deutoxide of copper. It is not changed by heat, but readily gives out its oxygen when heated with combustible matter; hence its general use in organic analysis for supplying oxygen.

II. (*Red Oxide. Syn. Dioxide of Copper.*) *Prep. a.* Mix 31·6 parts of copper filings with 39·6 parts of black oxide of copper, and heat them together in a covered crucible.

b. Boil a solution of the acetate of protoxide of copper with sugar; collect the red powder, wash it with water, and dry it.

c. Mix dichloride of copper with an equal weight of carbonate of soda, and fuse it at a low red heat, then well wash the mass with water, and dry the red powder.

d. Mix 100 parts of sulphate of copper with 57 parts of carbonate of soda, (both in crystals,) and fuse them at a gentle heat; cool, pulverize, add 25 parts of fine copper filings, ram the mixture into a crucible, cover it over, and expose it for 20 minutes to a white heat.

e. A saturated solution of sugar of milk, containing some carbonate of soda, is poured over recently prepared moist hydrated oxide of copper, and heated to boiling. A dark orange-colored precipitate of hydrate of protoxide of copper soon appears, from which saccharine matter is removed by washing in distilled water, and then dried.

f. (*Magnificently red anhydrous protoxide of copper.*) A solution of 27 parts of cane-sugar, in 60 parts of water, is poured over 9 parts of hydrate of oxide of copper, (weighed in the compressed and still moist state;) a solution of parts of caustic potassa, in 60 parts of water, is added; the whole mass well agitated together at the ordinary temperatures, and strained through linen. If the dark-blue liquid, after being passed through the strainer, is heated, continually stirring over the water-bath, anhydrous protoxide of copper is disengaged, and the liquid becomes colorless. (Boettger's Beitrage.)

Remarks. Red oxide of copper resembles metallic copper in appearance. It is used as a pigment and a bronze. By heat it is converted into the black oxide. With ammonia it forms a colorless solution, but rapidly becomes blue from the action of the air. This preparation was formerly called *protoxide of copper.*

III. (*Peroxide.*) Formed by the action of peroxide of hydrogen water, on the hydrated black oxide. (Thenard.) It is very liable to spontaneous decomposition.

Remarks. According to the opinions of Berzelius, Thompson, Liebig, Gregory, and others, the eq of copper is 31·6, and consequently the red oxide is a sub- or di-oxide, and the black the oxide or protoxide. The former containing 63·2 parts of copper and 8 of oxygen, and the latter 31·6 of copper and 8 of oxygen. But if the eq. of copper be taken at 63·2, as is done by some persons, the first of these preparations must be regarded as the protoxide, and the second as the deuto- or binoxide. The latter terms were generally applied to them in chemical works, until within the last few years. The black oxide has also been called the *peroxide.* This explanation is called for, to prevent the tyro in chemistry mistaking the one preparation for the other.

COPPER, SALTS OF. These are more or less poisonous, and may be recognised in the manner as described under the article Copper.

COPPER VESSELS. Culinary and pharmaceutical vessels are very commonly made of copper, but too much caution cannot be exercised in their employment. Acid sirups, vegetable juices, aqueous extracts, soups, stews, &c., prepared in copper saucepans, or boilers, receive a metallic contamination proportional to the length of time they are exposed to the action of the metal. Such vessels are frequently tinned, for the purpose of protecting the copper from contact with their contents, but this film of tin is necessarily very thin, and rubs off by constant use. When acids or acidulous fluids are boiled in vessels of imperfectly tinned copper, a portion of the tin is taken up by the liquid, and deposited upon the abraded or exposed part, thus protecting the copper from the farther action of the menstruum; but the protective power of such a deposite is limited, and it has been proved that when a coating of metal is extremely thin, though appearing quite perfect to the eye, it has a certain porosity, that permits the action of acids on the metal beneath. This has been proved to be the case, even when the deposite is of silver. (Warrington.) When copper vessels

is wished that the product should contain as little inert matter as possible; but when water at low temperatures is employed, the period of the maceration must be proportionately increased. By adopting the method of *maceration in vacuo*, the menstruum may be allowed to lie in contact with the vegetable matter for an unlimited period, without decomposition taking place.

Infusions, like decoctions, are liable to undergo spontaneous decomposition by keeping, especially in warm weather, when a few hours are often sufficient for their passage into a state of active fermentation; they should therefore be prepared for use daily, as beyond 24 hours they cannot be depended on. The London College directs a pint only to be made at a time, thus very properly regarding them as extemporaneous preparations. See DECOCTIONS.

*** As many infusions which are occasionally employed in medicine must necessarily escape notice in the following list, it may be as well to remark, that the INFUSIONS of all vegetables that do not exert a *very powerful* action on the human frame, may be made by pouring 1 pint of boiling water on 1 oz. of the vegetable matter, and allowing it to macerate for half an hour to an hour; and the DECOCTIONS of the same vegetables may be made by boiling the above ingredients in the same proportions for 10 or 15 minutes, instead of operating by mere infusion. *The ordinary dose* of such infusions and decoctions is 1 to 2 oz. three or four times a day.

INFUSION, ANTISCORBUTIC. *Syn.* INFUSUM ANTISCORBUTICUM. *Prep.* (E. H.) Water trefoil (menyanthes aquaticum) ℥ij; orange ℥ss; boiling water 4 pints; infuse for a night, strain, and add compound spirits of horseradish half a pint.

INFUSIONS, ASTRINGENT. *Syn.* INF. ASTRINGENS. *Prep.* I. Oak bark ℥ss; boiling water ½ pint; infuse 1 hour, and to each ℥iss of the strained liquor add powdered galls 10 grs.; tincture of catechu, compound tincture of cardamoms, and sirup of orange peel, of each ʒss, for a dose.

II. Infusion of cusparia ℥j; tincture of catechu or kino ʒj; powdered ipecacuanha 3 grs.; powdered opium ½ a gr.; mix for a dose. In diarrhœa, &c.

INFUSION, BITTER PURGING. *Syn.* INF. AMARUM PURGANS (P. L. 1746.) The same as compound gentian mixture.

INFUSION, CATHARTIC. *Syn.* INF. CATHARTICUM. *Prep.* I. Infusion of senna ℥j; tinctures of senna and jalap, tartrate of potassa, and sirup of senna, of each ʒj; mix, for a dose.

II. Infusion of senna ℥iss; Epsom salts ʒvj; tinctures of jalap and castor, of each ʒj; laudanum and tincture of ginger, of each 10 drops; mix, for 1 dose.

III. Infusion of senna ℥ij; potassio-tartrate of soda ʒvj; cinnamon water ℥ss; mix, for 2 doses.

IV. Senna leaves ½ oz.; Glauber salts 2 oz.; boiling water ½ pint; macerate for 2 hours, strain, and add tincture of ginger ¼ oz.; compound tincture of cardamoms 1 oz.; for 4 doses.

INFUSION, CEPHALIC. *Syn.* INF. CEPHALICUM. *Prep.* (E. H.) Valerian root ℥ij; rosemary ʒiv; boiling water 1 quart; infuse 12 hours, strain, and add aromatic water ℥iv. *Dose.* A wineglassful 3 or 4 times a day, as antispasmodic, and in various affections of the head.

INFUSION, DIURETIC. *Syn.* INF. DIURETICUM. *Prep.* I. Broom tops ℥ij; boiling water ℥xvj; infuse 1 hour, strain, cool, and add sweet spirits of nitre ʒiv. *Dose.* ℥j every other hour.

II. Infusion of foxglove ℥iv; tincture of foxglove ʒss; acetate of potassa ʒj; laudanum 10 drops. *Dose.* 1 tablespoonful twice or thrice a day.

III. Juniper berries ℥ij; aniseed ʒij; boiling water lb. j; infuse 1 hour; strain, and when cold, add compound spirit of juniper ℥ij; tincture of squills and nitre, of each ʒj. *Dose.* ½ a teacupful frequently. All the above are common diuretics in dropsies.

INFUSION OF ALOES. *Syn.* INF. ALOES. *Prep.* Socotrine or hepatic aloes, bruised, ʒiv; boiling water 1 pint; digest with agitation for 1 hour, and when cold pour off the clear. *Dose.* ½ oz. to 1 oz., alone or combined with ½ oz. of tincture of rhubarb; laxative.

INFUSION OF ALOES, (COMPOUND.) *Syn.* INF. ALOES COMPOSITUM. *Prep.* (Dr. Fothergill.) Aloes ʒj; rhubarb and calumba, of each ʒiv; lime water f℥viij; spirit of horseradish fʒiv; infuse for 12 hours. An excellent stomachic purgative.

INFUSION OF ANGELICA. *Syn.* INF ANGELICÆ. Angelica root ʒvj; boiling water 1 pint; macerate 2 hours and strain. Aromatic and stomachic.

INFUSION OF ARNICA. *Syn.* INF. ARNICÆ. *Prep.* I. (Dr. Joy.) Flowers of leopard's bane (arnica montana) ʒj; boiling water 1 pint; macerate half an hour.

II. (A. T. Thomson.) Leaves or flowers ʒiss or root ℈ij; boiling water f℥xij.

III. (Pereira.) Arnica (flowers or leaves?) ℥ss; boiling water 1 pint. Stimulant, diaphoretic, and diuretic. *Dose.* f℥ss to f℥j. The operation of arnica appears to resemble that of senega. (Sundelin.)

INFUSION OF BARBERRY. *Syn.* INF. BERBERIS. *Prep.* (Dr. Copland.) Bark of the barberry shrub ℥ss; boiling water ½ pint; macerate two hours, and strain. *Dose.* 1 to 2 oz. either alone or combined with a little carbonate of soda or potassa and tincture of calumba; in jaundice, biliary fluxes, and other cases where heat and acrimony prevail.

INFUSION OF BARK. *Syn.* INF. CINCHONÆ, (P. L. E. and D.) INF. CORTICIS CINCHONÆ. INFUSION DE QUINQUINA, (*Fr.*) INFUSO DI CHINA, (*Ital.*) CHINAINFUSUM, (*Ger.*) *Prep.* I. (P. L.) Lanceleaved (pale) cinchona, bruised, ℥j; boiling water 1 pint; macerate for 6 hours in a lightly covered vessel, and strain.

II. (*Inf. cinchonæ sine calore.*) *Prep.* (P. D.) Triturate the bark with a little of the water, and add the remainder (cold) during the trituration; macerate for 24 hours, and decant the clear liquor

III. (P. E.) From any species of cinchona, in a similar way to the infusion of cinchona, P. L.

Remarks. The addition of fʒj of diluted sulphuric acid to the water before pouring on the bark increases its solvent power, and, consequently, the strength of the infusion. *Dose.* f℥j to f℥ij three or four times daily, as a tonic in dyspepsia and convalescences. (See DECOCTION OF BARK.)

INFUSION OF BARK AND MAGNESIA

Syn. INF. CINCHONÆ CUM MAGNESIA. *Prep.* (P. U. S.) Bruised bark ℥j; calcined magnesia ʒj; boiling water f℥xij; boil, digest 1 hour, and strain.

INFUSION OF BARK WITH LIME WATER. *Syn.* INF. CINCHONÆ CUM AQUA CALCIS. *Prep.* (P. U. S.) Bruised cinchona bark ℥j; lime water (cold) 1 pint; macerate 12 hours in a covered vessel.

INFUSION OF BARK, COMPOUND. *Syn.* INF. CINCHONÆ COMPOSITUM. *Prep.* (St. B. H.) Cinchona bark ℥j; red rose leaves ʒiij; orange peel (dried) ʒij; boiling water 1 pint; macerate 2 hours in a covered vessel, strain, and add diluted sulphuric acid ʒiss.

INFUSION OF BARK, CONCENTRATED. *Prep.* I. Coarsely-powdered bark 4 lbs.; boiling water 8 lbs.; macerate for 10 or 12 hours, express the liquor, add rectified spirit of wine 2 lbs.; mix well, let it repose for 24 hours, and filter the clear portion.

II. To the water employed in the last portion, add *diluted* sulphuric acid 2 or 3 fluid ounces, and proceed as before.

III. Coarsely-powdered bark 4 lbs.; cold water 8 lbs.; rectified spirit 2 lbs.; diluted sulphuric acid 3 or 4 oz.; mix the fluids, and either macerate the bark in them for a week in a *closed* vessel, or proceed by the method of displacement. *Product* very superior.

Remarks. One fluid drachm of either of the above, added to 7 fluid drachms of water, produces an extemporaneous infusion of cinchona resembling that of the pharmacopœia.

INFUSION OF BLUE FLAG. *Prep.* Blue flag flowers 1 to 2 oz.; boiling water 1 pint; macerate. *Used* for the color.

INFUSION OF BRAZIL WOOD. *Prep.* From ground Brazil wood as the last. When wanted to keep, 3 oz. of rectified spirit are added to every pint. *Used* as coloring.

INFUSION OF BROOM. *Syn.* INF. SCOPARII. *Prep.* (P. L.) Fresh broom tops ℥j; boiling distilled water 1 pint; macerate for 4 hours in a lightly-covered vessel, and strain. Diuretic *or* purgative. *Dose.* 1 to 4 oz.

INFUSION OF BUCHU. *Syn.* INF. BUCHU, (P. D.) INF. BUCKU, (P. E.) INF. DIOSMÆ, (P. L.) *Prep.* (P. L.) Buchu leaves ℥j; boiling water 1 pint; macerate 2 hours. Tonic, stimulant, and diuretic. *Dose.* 1½ oz. to 2 oz.

INFUSION OF CALUMBA. *Syn.* INF. RADICIS CALUMBÆ. INF. CALUMBÆ, (P. L. & E.) INF. COLOMBÆ, (P. D.) *Prep.* I. (P. L.) Calumba root, sliced, ʒv; boiling distilled water 1 pint; macerate for 2 hours in a lightly-covered vessel, and strain. The Dublin form is similar, but orders only ʒij of calumba root.

II. (*Infusum calumbæ cum aqua frigida.*) *Prep.* (P. E.) Calumba, in coarse powder, ℥ss; cold water 1 pint; triturate with a little of the water so as to moisten it thoroughly, then put it into a percolator, and pass cold water through it until f℥xvj of infusion have been obtained.

Remarks. The infusion prepared by the first of the above formulæ soon spoils, but that prepared by the second will keep for some days. Infusion of calumba is a good tonic and stomachic bitter. *Dose.* 1 to 3 ounces in dyspepsia, &c., and for restraining vomiting and diarrhœa during pregnancy or dentition. It is preferably joined with small doses of carbonate of soda or potassa.

INFUSION OF CALUMBA, (CONCENTRATED.) *Prep.* I. Calumba, in coarse powder, ℥v; boiling water ℥xvj; macerate 2 hours; strain, add rectified spirit ℥iv; and the next day filter.

II. Coarsely-powdered calumba root 5 lbs.; rectified spirit of wine 5½ pints; cold water 11 pints; macerate in a closed vessel with frequent agitation for 5 days; express the liquor, add the whites of 4 or 5 eggs, previously mixed with ½ pint of cold water, agitate well for 10 minutes, allow it to repose for 1 week, and decant the clear. Should it not be perfectly transparent, it may be filtered through blotting paper. *Product.* 20 lbs.

III. From the same ingredients as the last, but by the method of displacement.

Remarks. The concentrated infusion produced by the last two formulæ is of *very superior quality*, and has acquired a great sale in the wholesale trade. fʒj added to fʒvij of water makes a perfectly transparent liquid, possessing exactly similar virtues to the infusion of calumba, P. L.

INFUSION OF CAPSICUM. *Syn.* INF. CAPSICI. *Prep.* (Pereira.) Powdered capsicum ʒiv; boiling water 1 pint; macerate in a covered vessel for 2 hours. *Dose.* ½ oz. and upwards in malignant sore throat and scarlatina.

INFUSION OF CASCARILLA. *Syn.* INF. CORTICIS CASCARILLÆ. INF. CASCARILLÆ, (P. L. E. & D.) *Prep.* (P. L.) Cascarilla bark, bruised, ℥iss; boiling water 1 pint; macerate 2 hours, and strain. A light and aromatic bitter tonic. *Dose.* 1 to 3 oz., usually combined with carbonate of soda and tincture of cascarilla. It is an excellent medicine in various stomach complaints, debility, diarrhœa, &c.

INFUSION OF CASCARILLA, (CONCENTRATED.) *Prep.* Cascarilla, (good and fragrant,) bruised, 6 lbs.; rectified spirit of wine 3 pints; cold water 6 pints; macerate in a close vessel for 14 days, express the liquor, and filter.

Remarks. The product, if the preceding process be well managed, resembles brandy in color and transparency, and is delightfully fragrant. Should it, however, prove slightly opaque, it may be rendered *brilliant* by shaking it up, first with about a drachm of dilute sulphuric acid, and afterwards with the whites of 3 or 4 eggs, previously mixed with a few ounces of water; it will then either become fine by repose or by filtration. Concentrated infusion of cascarilla may also be advantageously made from the same ingredients by the method of displacement. (See INFUSION OF CALUMBA, CONCENTRATED.) fʒj of this infusion, mixed with fʒvij of water, makes a preparation exactly resembling the infusion of calumba, P. L.

INFUSION OF CATECHU. *Syn.* COMPOUND INFUSION OF CATECHU. INF. CATECHU, (P. E.) INF. CATECHU COMPOSITUM, (P. L. & D.) INFUSION DE CACHOU, (*Fr.*) KATECHU-INFUSUM, (*Ger.*) *Prep.* (P. L.) Catechu ʒvj; bruised cinnamon ʒj; boiling water 1 pint; macerate 1 hour.

Remarks. The Edinburgh college orders f℥xvij of water, and the addition of f℥iij of sirup to the strained liquid. Astringent. *Dose.* 1 to 3 oz. in diarrhœa, 3 or 4 times a day, or after every liquid dejection.

INFUSION OF CENTAURY. *Syn.* INF. CENTAURII. *Prep.* I. (A. T. Thomson.) Summits of (common or lesser) centaury ℨvj; boiling water ½ pint.

II. (P. Cod.) Leaves ℨj; water f℥xvj. Bitter, stomachic; has been proposed as a substitute for infusion of gentian.

INFUSION OF CHAMOMILES. *Syn.* CHAMOMILE TEA. INF. ANTHEMIDIS, (P. L. & E.) INF. CHAMÆMELI, (P. D.) INFUSION DE CAMOMILLE ROMAINE, (*Fr.*) *Prep.* (P. L.) Chamomile flowers ℨv; boiling water 1 pint; macerate 10 minutes, (20 minutes, P. E.,) and strain. Tonic, bitter, and stomachic. *Dose.* 1 to 2 oz. two or three times a day. It should be drunk cold, as it is emetic when warm.

INFUSION OF CHAMOMILES, (CONCENTRATED.) *Prep.* Chamomiles 5 oz.; water 1 pint; boil till the mixture weighs exactly 21 oz.; express the liquor by means of a tincture-press, cool, and add essential oil of chamomile 15 drops, dissolved in rectified spirit of wine 5 oz.; agitate well, let it repose until the next day, then decant the clear, and filter. *Product.* Strongly bitter and odorous, and beautifully transparent. 8 times as strong as the infusion, P. L.

INFUSION OF CHERRY-LAUREL. *Syn.* INF. LAURO-CERASI. *Prep.* (Dr. Cheston.) Fresh cherry-laurel leaves ℥iv; boiling water f℥xxxij; infuse an hour, strain, and add clarified honey ℥iv. This infusion is employed externally; in large doses it is poisonous.

INFUSION OF CHIRETTA. *Syn.* INF. CHIRAYTÆ. INF. CHIRETTÆ. *Prep.* (P. E.) Chiretta ℥iv; boiling water 1 pint; macerate 2 hours. A tonic bitter. *Dose.* 1 to 2 oz. combined with carbonate of soda or tincture of sesquichloride of iron in dyspepsia and debility.

INFUSION OF CLOVES. *Syn.* INF. CARYOPHILLORUM. INF. CARYOPHILLI, (P. L. E. & D.) *Prep.* (P. L.) Bruised cloves ℨiij, (ℨi, P. D.;) boiling water 1 pint; macerate for 2 hours, and strain. A grateful stomachic. *Dose.* 1 to 2 oz. three or four times a day.

INFUSION OF CLOVES, (CONCENTRATED.) *Prep.* I. Bruised cloves ℥iij; boiling water f℥xv; infuse as above and strain; when cold add rectified spirit ¼ pint, and filter.

II. Bruised cloves 1½ lbs.; rectified spirit 1 quart; cold water 3 quarts; macerate for 7 days, express the liquid, and filter. *Product.* Very fine.

Remarks. The above is 8 times the strength of the infusion of cloves, P. L.

INFUSION OF CUSPARIA. *Syn.* INFUSION OF ANGOSTURA. INF. CUSPARIÆ, (P. L. & E.) INF. ANGUSTURÆ, (P. D.) *Prep.* (P. L.) Angustura bark ℨv; boiling water 1 pint; macerate 2 hours. Stimulant and tonic. *Dose.* 1 to 3 oz. three or four times a day, in typhus fever, bilious diarrhœa, dysentery, &c.

INFUSION OF DAHLIA PETALS. From the violet blue variety, 1 oz. to a pint of boiling water.

INFUSION OF DEADLY NIGHTSHADE. *Syn.* INF. BELLADONNÆ. *Prep.* I. (Dr. Paris.) Dried belladonna leaves 4 grs.; boiling water f℥ij; for a dose.

II. (Dr. Saunders.) Leaves ℨss; boiling water f℥xij; infuse, strain, and to every f℥vij of the infusion add compound tincture of cardamoms ℥j.

INFUSION OF DIGITALIS. *Syn.* INF. OF FOXGLOVE. INF. DIGITALIS. (P. L. E. & D.) INFUSION DE DIGITALE PURPURINE, (*Fr.*) FINGERHUT AUFGUSS, (*Ger.*) *Prep.* (P. L.) Dried foxglove leaves ℨj; spirit of cinnamon f℥j; boiling distilled water 1 pint; macerate the leaves in the water for 4 hours; strain, and add the spirit.

Remarks. The Dublin form is similar, but the Edinburgh college orders ℨij of the dried leaves. Diuretic and narcotic. *Dose.* ½ oz. to 1 oz. every 8 or 10 hours, till it exerts a sensible effect upon the body.

INFUSION OF ERGOT. *Syn.* INF. ERGOTÆ. INF. SECALIS CORNUTI. *Prep.* (Pereira.) Ergot ℨj; boiling water f℥iv; infuse till cold. *Dose.* One third every half hour until the whole is taken; in labor.

INFUSION OF EUPATORIUM. *Syn.* INF. EUPATORII. *Prep.* (P. U. S.) Eupatorium (perfoliata) ℥j; boiling water 1 pint; macerate 2 hours.

INFUSION OF FUMATORY. *Syn.* INF. OF FUMARIA. INF. FUMARIÆ. *Prep.* Fumaria (officinalis) 1 handful; boiling water 1 quart; infuse one hour. For skin diseases.

INFUSION OF GALLS. *Syn.* INF. GALLÆ. *Prep.* (Pereira.) Bruised galls ℨiv; boiling water f℥vj; infuse. *Dose.* ½ oz. to 2 oz. in intermittents, or 3 to 4 oz. in cases of poisoning by the alkaloids. It is also used in gargles, injections, and embrocations.

INFUSION OF GENTIAN, COMPOUND. *Syn.* INF. GENTIANÆ, (P. E.) INF. GENTIANÆ COMPOSITUM, (P. L. & D.) *Prep.* I. (P. L.) Gentian root, sliced, and *dried* orange-peel, of each, ℨij; *fresh* lemon-peel ℨiv; boiling distilled water 1 pint; infuse for one hour, and strain.

II. (P. E.) Sliced gentian root ℥ss; bitter orange-peel, dried and bruised, and coriander seeds, of each ℨj; proof spirit f℥iv; digest 3 hours, then add of cold water f℥xvj, and in 12 hours more, strain.

III. (P. D.) Gentian ℨij; fresh lemon-peel ℥ss; dried orange-peel ℨiss; proof spirit f℥iv; macerate 3 hours, then add of boiling water f℥xvj, and digest for 2 days in a closed vessel.

Remarks. The above are elegant tonics and stomachics. The dose of the infusion (P. L. and D.) is 1 to 2 oz., that of the infusion (P. E.) ½ oz. to 1 oz. The first speedily spoils, but the infusions of the Edinburgh and Dublin colleges will keep for some time in close vessels.

INFUSION OF GENTIAN, COMPOUND, (CONCENTRATED.) *Prep.* I. Bruised gentian root 4 lbs.; boiling water sufficient to cover it; infuse with occasional agitation for 2 hours, express the liquor, wash the root with a little boiling water, and evaporate to 13 quarts; when *cold*, strain through flannel, add rectified spirit of wine 1 gallon, and pour the mixed fluids on *dried* orange-peel 4 lbs., and *fresh* lemon-peel 8 lbs.; macerate for 1 week, then express the liquor, and filter through paper.

II. Bruised gentian and dried orange-peel, of each 4 lbs.; fresh lemon-peel 8 lbs.; cold distilled water 13 quarts; rectified spirit of wine 1 gallon; pour the mixed fluids on the other ingredients

placed in a stoneware jar, bung close, tie over the vessel with bladder and canvass, and macerate for 14 or 15 days, observing to let the vessel remain *upright* during the night, but *inverted* during the day. At the end of the time express the liquid, add 1 drachm each of the essences of lemon and orange, agitate well, and filter; it runs rapidly through paper. *Product of very superior quality.*

III. Bruised gentian 4½ lbs.; essence of lemon ½ oz.; essence of orange ¼ oz.; essence of cedrat 1 dr.; rectified spirit of wine 1 gallon; cold water 3 gallons; infuse with agitation for a fortnight, press, and filter. *Product.* Very fine and odorous.

Remarks. The above formulæ are actually employed at the present time by houses who do largely in concentrated infusion of gentian, and with proper management the products, especially of the last two, possess all the brilliancy of brandy, and are powerfully bitter, odorous, and aromatic; they also keep well: f℥j added to f℥vij of water, produce a liquid resembling the infusion of the Pharmacopœia in every particular.

INFUSION OF GINGER. *Syn.* Inf. Zingiberis. *Prep.* (Pereira.) Ginger, bruised, ʒij to ʒiij; boiling water f℥vj; macerate for 2 hours. *Dose.* 1 or 2 tablespoonfuls in flatulence and indigestion.

INFUSION OF GRATIOLA. *Syn.* Inf. Gratiolæ. *Prep.* (A. T. Thomson.) Gratiola, dried, ʒij; boiling water f℥viij.

INFUSION of GUAIACUM, COMPOUND. *Syn.* Compound Lime-water. Aqua Calcis composita, (P. D.) Inf. Guaiaci comp. *Prep.* (P. D.) Guaiacum shavings lb. ss; bruised liquorice root ℥j; sassafras ℥ss; coriander seeds ʒiij; lime-water 3 quarts; infuse for 2 days, and strain. *Dose.* 3 to 4 oz. twice or thrice a day, in scrofula, rheumatism, eruptions, &c.

INFUSION OF GUM. *Syn.* Inf. Acaciæ. *Prep.* Gum acacia and lump sugar, of each 2 oz.; boiling water 1 pint; macerate until dissolved, then cool, and add orange-flower water ½ oz. A pleasant demulcent in coughs, hoarseness, &c.

INFUSION OF (STINKING) HELLEBORE. *Syn.* Inf. of Bearsfoot. Inf. Hellebori fœtidi. *Prep.* (Woodville.) Fresh leaves of stinking hellebore ʒij, or dried leaves ʒss; boiling water f℥viij; infuse 1 hour. Cathartic, emetic.

INFUSION OF HEMEDESMUS. *Syn.* Inf. Hemedesmi. *Prep.* (Ashburner.) Root of hemedesmus indicus ℥ij; lime-water 1 pint; infuse 12 hours.

INFUSION OF HEMLOCK. *Syn.* Inf. Conii. Inf. Conii maculati. *Prep.* (Guy's H.) Dried leaves of hemlock and coriander seeds, of each ʒij; boiling water ℥viij; infuse for 2 hours. Combined with acetate of ammonia, tincture of henbane, and sirup of poppies, in pulmonary complaints.

INFUSION OF HOLY THISTLE. *Syn.* Inf. Cardui Benedicti. *Prep.* (P. Cod.) Holy thistle ʒj; boiling water f℥viij; macerate 2 hours. Bitter, tonic, and astringent; in stomach diseases.

INFUSION OF HOP. *Syn.* Inf. Lupuli, (P. L.) Inf. Humuli. *Prep.* (P. L.) Hops ʒvj; boiling water 1 pint; infuse for 4 hours. Tonic and anodyne. *Dose.* f℥j to f℥ij. Well-hopped mild ale is a good substitute.

INFUSION OF HOREHOUND. *Syn.* Inf. Marubii. *Prep.* (Pereira.) Horehound leaves ℥j; boiling water 1 pint; infuse for an hour. *Dose.* ½ to a whole teacupful in coughs, colds, &c.

INFUSION OF HORSERADISH. *Syn.* Inf. Armoraciæ. *Prep.* Horseradish, sliced, ℥iss; boiling water 1 pint; infuse one hour. Diuretic and stomachic. *Dose.* 3 or 4 tablespoonfuls every 3 or 4 hours.

INFUSION OF HORSERADISH, COMPOUND. *Syn.* Inf. Armoraciæ compositum. *Prep.* (P. L.) Sliced horseradish and bruised mustard seed, of each ℥j; compound spirit of horseradish f℥j; boiling water 1 pint; infuse the root and seeds in the water for 2 hours, strain, cool, and add the spirit. Stimulant and diuretic. *Dose.* 1 to 3 oz. every second or third hour, in paralysis, dropsies, &c.

INFUSION OF JUNIPER BERRIES. *Syn.* Inf. Juniperi. Inf. Baccæ Juniperi. *Prep.* (Pereira.) Juniper berries ℥j; boiling water 1 pint; infuse 1 hour. Diuretic. *Dose.* ½ to a whole teacupful, ad libitum.

INFUSION OF LINSEED, (CATHARTIC.) *Syn.* Inf. Lini cathartici. *Prep.* (A. T. Thomson.) Cathartic linseed (purging flax) ʒij; boiling water f℥xvj; infuse 1 hour, and strain.

INFUSION OF LINSEED, COMPOUND. *Syn.* Linseed Tea. Inf. Lini, (P. E.) Inf. Lini compositum, (P. L. and D.) Infusion de Semence de Lin, (*Fr.*) Leinsamen Aufguss, (*Ger.*) Infuso di Semi di Lino, (*Ital.*) *Prep.* (P. L.) Linseed ʒvj; bruised liquorice root ʒij; boiling water 1 pint; macerate for 4 hours near the fire, and strain. A cheap and useful demulcent. *Dose.* f℥ij ad libitum. In pulmonary and urinary irritation.

INFUSION OF LIQUORICE. *Syn.* Inf. Glycyrrhizæ. *Prep.* (St. B. H.) Fresh liquorice root ℥j; boiling water 1 pint; macerate 2 hours. Demulcent; taken ad libitum.

INFUSION OF LITMUS. See Infusion of Archil, page 72.

INFUSION OF LOBELIA. *Syn.* Inf. Lobeliæ. Inf. Lobeliæ inflatæ. *Prep.* (Collier.) Lobelia (Indian tobacco) ℥j; boiling water ½ a pint; infuse half an hour, and strain. *Dose.* f℥ss every half hour until it nauseates. In asthma.

INFUSION OF LOGWOOD. *Syn.* Inf. Hæmatoxyli. *Prep.* Logwood 1 oz.; boiling water 1 pint; infuse 1 hour. *Used* as a color and test.

INFUSION OF MALLOW FLOWERS. As the last.

INFUSION OF NARCISSUS. *Syn.* Inf. Narcissi. *Prep.* (Dufresnoy.) Flowers 3 to 16 in number; boiling water 1 pint; infuse.

INFUSION OF ORANGE-PEEL, COMPOUND. *Syn.* Inf. Aurantii. Inf. Aurantii compositum, (P. L.) *Prep.* (P. L.) Dried orange-peel ℥ss; fresh lemon-peel ʒij; bruised cloves ʒj, boiling water 1 pint; infuse for 15 minutes, and strain. A pleasant stomachic. *Dose.* 1 or 2 oz. twice or thrice a day.

INFUSION OF ORANGE-PEEL, COMPOUND, (CONCENTRATED.) *Prep.* I. Dried orange-peel 3 lbs.; fresh lemon-peel 1½ lbs.;

bruised cloves ¾ lb.; boiling water 9 pints; infuse for 20 minutes, press out the liquor, and when cold, add rectified spirits 1 quart; filter.

II. Dried orange-peel 3 lbs.; fresh lemon-peel 1½ lb.; bruised cloves ¾ lb.; rectified spirit 3 pints; cold water 9 pints; macerate for 1 week, press, and filter. *Product very superior.*

Remarks. f℥j of either of the above, added to f℥vij of water, makes a similar (preferable) preparation to the compound infusion of orange-peel, P. L.

INFUSION OF PEACH LEAVES. *Syn.* INF. PERSICÆ. *Prep.* (Pereira.) Dried peach leaves ℥ss; boiling water 1 pint. *Dose.* ½ oz. 2 or 3 times a day. As a vermifuge, and to allay irritation of the bladder and urethra.

INFUSION OF PEPPERMINT. *Syn.* INF. MENTHÆ PIPERITÆ. *Prep.* 1 oz. of the herb to 1 pint of boiling water. *Dose.* A teacupful ad libitum, as a stomachic.

INFUSION OF PAREIRA. *Syn.* INF. PAREIRÆ. *Prep.* (P. L.) Pareira brava ʒvj; boiling water 1 pint; macerate 2 hours. *Dose.* 1 to 2 oz., in irritation of the urinary organs.

INFUSION OF PERIWINKLE. *Prep.* Petals 1 oz. to boiling water 1 pint.

INFUSION OF PYROLA. *Syn.* INF. OF WINTER GREEN. INF. CHIMAPHILÆ. INF. PYROLÆ. *Prep.* (Collier.) Pyrola leaves ℥j; boiling water 1 pint; infuse. Astringent, diuretic. *Dose.* 1 to 2 oz. It blackens the urine, like uva ursi.

INFUSION OF QUASSIA. *Syn.* INF. QUASSIÆ. *Prep.* (P. L.) Quassia wood chips ℈ij; boiling distilled water 1 pint; macerate for 2 hours, and strain. *Dose.* 1 to 3 oz. twice or thrice a day, in dyspepsia, &c. It is not turned black by chalybeates.

INFUSION OF QUASSIA AND ZINC. *Syn.* INF. QUASSIÆ CUM ZINCI SULPHATE. *Prep.* (P. U. S.) Quassia ʒj; sulphate of zinc 8 grs.; boiling water ½ pint.

INFUSION OF RED CABBAGE. 1 oz. of the dried leaves to boiling water 1 pint. *Use.* As a color and test. It will not keep without the addition of 1½ to 2 oz. of spirit to the above quantity.

INFUSION OF RHATANY. *Syn.* INF. RHATANIÆ. INF. KRAMERIÆ. *Prep.* (P. L.) Rhatany root ℥j; boiling water 1 pint; infuse 2 hours. Astringent. *Dose.* ½ oz. to 2 oz. in chronic diarrhœa.

INFUSION OF RHUBARB. *Syn.* INF. RHEI. (P. L. E. & D.) *Prep.* (P. L.) Sliced rhubarb ʒiij; distilled water 1 pint; macerate 2 hours, and strain.

II. (P. E.) Rhubarb, in coarse powder, ℥j; boiling water ℥xviij; infuse for 12 hours, add spirit of cinnamon f℥ij, and strain through linen or calico. Stomachic and purgative. *Dose.* Of the infusion P. L. f℥j to f℥iij, and that of the P. E. about half that quantity, along with neutral salts or aromatics.

INFUSION OF RHUBARB, ALKALINE. *Syn.* INF. RHEI ALKALINUM. *Prep.* (Dr. Copland.) Rhubarb ʒij; carbonate of potassa ʒj; boiling water ½ a pint; infuse for 4 hours, strain, and add tincture of cinnamon ℥ss.

INFUSION OF RHUBARB AND BORAX. *Syn.* INF. RHEI BORAXATUM. *Prep.* (P. Pol.) Rhubarb ʒvj; borax ʒj; boiling water ℥vj; infuse, strain, and add of cinnamon water ℥j.

INFUSION OF RHUBARB, CONCENTRATED. *Prep.* Rhubarb reduced to coarse powder 3 lbs.; *cold* distilled water 11 pints; rectified spirit of wine 5½ pints; mix, let it stand for 8 days, employing frequent agitation, then press out the liquor, and filter.

Remarks. The product of the above process is 8 times as strong as the infusion of rhubarb, P. L. This is the only way a fine, rich-colored, and transparent concentrated preparation can be made, that will keep. Should it not prove perfectly limpid it may be clarified with a little white of egg, as directed under INFUSION OF CALUMBA, CONCENTRATED.

INFUSION OF ROSES. *Syn.* INF. ROSÆ 1 oz. of petals to a pint of boiling water.

INFUSION OF ROSES, COMPOUND *Syn.* INF. ROSÆ, (P. E.) INF. ROSÆ COMPOSITUM, (P. L.) INF. ROSÆ ACIDUM, (P. D.) INF. ROSARUM. INF. ROSARUM COMP. TINCTURA ROSARUM, (P. L. 1746.) INFUSION DES ROSES, (*Fr.*) ROSEN AUFGUSS, (*Ger.*) INFUSO DI ROSE, (*It.*) *Prep.* (P. L.) Dried petals of the red rose ʒiij; diluted sulphuric acid fʒiss; (℥ss, P. D.;) boiling distilled water 1 pint, (lb. iij by measure, P. D.;) white sugar ʒvj; (℥iss, P. D.) Pour the water on the petals, placed in a vessel of glass or earthenware, stir in the acid, and infuse for 6 hours, strain, and add the sugar.

Remarks. The Edinburgh College orders the acid not to be added until after the infusion is strained from the leaves, and the period of the maceration to be only 1 hour. Infusion of roses is principally used as a vehicle for sulphate of quinine, saline purgatives, and other medicines. It is astringent and refrigerant, and, when diluted with water, forms a pleasant drink in febrile disorders, phthisical sweats, hemorrhages, diarrhœa, &c. *Dose.* f℥j to f℥iv, either alone or diluted with water. It is incompatible with the alkalis and earths.

INFUSION OF ROSES, CONCENTRATED. *Prep.* I. Rose petals or leaves 3 lbs.; boiling water 2 gallons; infuse 2 hours, with constant agitation, then press out the liquor in a *very clean* tincture press, strain through flannel or a hair sieve, add diluted sulphuric acid 24 oz., (by measure,) agitate well, and filter through paper supported on coarse calico; lastly, add 6 lbs. of the finest white sugar broken up into small lumps, but perfectly free from dust and dirt. When dissolved, put the infusion into clean, stoppered green glass bottles, and keep it from the light in a cool place. *Product* very superior.

II. Take rose leaves, acid, and *cold* water, as last, mix, and infuse for 48 hours in a clean, covered, earthenware vessel, then press out the liquid with the hands, filter, and add the sugar, as before. *Product* very fine, and keeps well.

Remarks. The above infusion is 8 times as strong as that of the London Pharmacopœia. In employing the first formula, care should be taken that the utensils be *perfectly clean*, especially the press, and earthenware glazed with lead should be avoided. The "*pressing*" should also be conducted as rapidly as possible, to avoid the color being injured by the iron, though I find that clean iron does not readily injure infusion of roses *before* the addition of the acid. Should not the infusion filter

quite clear through paper, the addition of the whites of 2 or 3 eggs, diluted with 2 or 3 ounces of water, followed by violent agitation of the liquid for a few minutes, and repose for an hour or two, will usually render it fine, when it may either be decanted or filtered should it require it. It will now pass rapidly through ordinary filtering paper, and at once run clear.

INFUSION OF SAGE. *Syn.* INF. SALVIÆ. *Prep.* (A. T. Thomson.) Sage leaves, dried, ℥j; boiling water 1 pint; infuse ½ an hour. Aromatic.

INFUSION OF SARSAPARILLA. *Syn.* INF. SARZÆ. INF. SARSAPARILLÆ. *Prep.* Sarsaparilla, sliced, ℥j; boiling water 1 pint; macerate 2 hours, and strain.

INFUSION OF SARSAPARILLA, COMPOUND. *Syn.* INF. SARZÆ COMP. INF. SARSAPARILLÆ COMPOSITUM, (P. D.) *Prep.* Sarsaparilla washed in cold water, and sliced, ℥j; lime water 1 pint; macerate in a close vessel for 12 hours, with frequent agitation. Alterative, in skin diseases, or with or after a course of mercurials. Lime water extracts less from sarsaparilla than cold distilled water. (Battley.)

INFUSION OF SENNA. *Syn.* INF. SENNÆ. *Prep.* Senna leaves ℥iss; boiling water 1 pint; macerate 2 hours. Purgative. *Dose.* 1 oz. combined with 3 to 6 drs. of Epsom salts, or other saline purgative.

INFUSION OF SENNA, COMPOUND. *Syn.* SENNA TEA. INF. SENNÆ COMPOSITUM, (P. L. & D.) INF. SENNÆ, (P. E.) INFUSION DE SENE, (*Fr.*) SENNA AUFGUSS, (*Ger.*) INFUSO DI SENNA, (*It.*) *Prep.* (P. L.) Senna leaves ʒxv; bruised ginger ℈iv; boiling water 1 pint; macerate 1 hour, and strain. Purgative. *Dose.* 2 to 4 oz., usually combined with some aperient salt.

INFUSION OF SENNA, COMPOUND. (CONCENTRATED.) *Prep.* I. Alexandria senna (Opt.) 6 lbs.; bruised unbleached Jamaica ginger 2¾ lbs.; rectified spirit, and water, of each 1 gallon; macerate for 14 days, press out the fluid, filter, and set it aside in a well-corked bottle; then take 24 lbs. of good East India senna, and the pressings from the tincture, (above,) and macerate in the least possible quantity (10 or 12 gallons) of *cold* water, for 12 or 14 hours, employing frequent agitation; press out the liquid, and again macerate the residue in *cold* water (5 or 6 gallons) for 2 hours; press, mix the two liquors, strain, heat gradually to the boiling point, carefully separate the coagulated albumen, and evaporate as quickly as possible to exactly 9 quarts; put the liquid into a vessel capable of holding 5 gallons, bung close to exclude the air, and when cold add the "*tincture*" obtained from the Alexandria senna and ginger; mix well, allow it to stand for a week, and decant the clear portion. This process, if skilfully managed, yields a beautiful article.

II. The same as the last, but employ *hot* water, and limit the period of the infusions to 2 hours and 1 hour. *Prod.* Good, but there is a large deposite, from which the last portion of the infusion cannot be readily procured.

III. Take 8 times the pharmacopœia quantity of senna and ginger, put them into a percolator, either alone, or mixed with clean washed sand, and pass water, mixed with ⅛th rectified spirit, through the mass, until the proper quantity of infusion is obtained. *Product* very superior, but the process requires considerable address to manage it satisfactorily.

Remarks. All the preceding forms are at present actually employed in the wholesale trade, and with proper management cannot possibly fail of producing superior products. They each give an infusion possessing 8 times the strength of that of the pharmacopœia.

From the extreme bulkiness of senna, it has become a practice with some unprincipled persons to employ only ½ or ¼ of the proper quantity of that drug, and to add burnt sugar or treacle to bring up the consistence and color, and an alkaline solution of gamboge to impart the necessary purgative quality; but this fraudulent practice may be detected in the way described at p. 292, (Art. EXTRACT of COLOCYNTH, COMP.) Pure infusion of senna reddens litmus paper. Concentrated infusion of senna, as generally met with, is next to worthless. This arises either from the employment of inferior senna, or the destruction of its active principle, by lengthened exposure to heat and atmospheric oxygen, during its manufacture.

INFUSION OF SENNA AND TAMARINDS. *Syn.* INF. SENNÆ COMPOSITUM, (P. E.) INF. SENNÆ CUM TAMARINDIS, (P. D.) *Prep.* (P. E.) Senna ʒiij; tamarinds ℥j; coriander seeds ʒj; sugar ℥ss, (if brown ℥j;) boiling water f℥viij; infuse for 4 hours, with agitation, then strain through calico. Pleasanter than the ordinary infusions of senna.

INFUSION OF SENNA AND CREAM OF TARTAR. *Syn.* INF. SENNÆ TARTARIZATUM. *Prep.* (P. L. 1788.) Senna ℥iss; coriander seeds ℥ss; cream of tartar ʒij; boiling water lb.j; infuse 1 hour. Purgative.

INFUSION OF SENNA, LEMONATED. *Syn.* INF. SENNÆ LIMONIATUM. *Prep.* (P. L. 1746.) Senna ℥iss; fresh lemon peel ℥j; lemon juice f℥j; boiling water f℥xvj; as last.

INFUSION OF SENEGA. *Syn.* INF. SENEGÆ. *Prep.* (P. E.) Senega (rattlesnake) root ʒij; boiling water 1 pint; infuse for 4 hours.

INFUSION OF SERPENTARY. *Syn.* INF. SERPENTARIÆ. *Prep.* (P. L. & E.) Serpentary (Virginian snake) root ʒiv; boiling water 1 pint; macerate for 4 hours. Tonic, stimulant, and diaphoretic. *Dose.* ½ oz. to 2 oz., in low fevers.

INFUSION OF SIMAROUBA. *Syn.* INF. SIMAROUBÆ, (P. L. E. & D.) *Prep.* (P. L.) Simarouba bark ʒiij; boiling water 1 pint; macerate 2 hours. *Dose.* 1 to 2 oz., as a tonic; emetic in larger doses.

INFUSION OF SPIGELIA. *Syn.* WORM TEA. INF. OF PINK ROOT. INF. SPIGELIÆ. *Prep.* (P. U. S.) Pink root ℥ss; boiling water f℥xv; infuse for 2 hours. Vermifuge. *Dose.* ½ oz. to 1 oz., for a child 3 years of age; for an adult 4 to 8 oz., morning and evening. It is usually combined with an equal quantity of infusion of senna, and, in America, with manna and savine as well.

INFUSION OF SPIGELIA AND SENNA. *Syn.* INF. SPIGELIÆ CUM SENNA. *Prep.* Pink root and senna, of each, ʒiv; boiling water 1 pint; as last.

INFUSION OF SPIGELIA, COMPOUND. *Syn.* INF. SPIGELIÆ COMPOSITUM. *Prep.* (Sprague.) Pink root ℥ss; senna ʒij; orange peel, worm seed,

regular course, but it is often productive of most serious consequences, by superinducing the inflammation of some organ, or laying the foundation of phthisis.

Cough is sometimes attended by copious expectoration, and at other times exists without any; it has hence been distinguished into *moist* or *mucous* cough, and *dry* cough.

Treat. The treatment of common catarrhal cough consists in allaying the irritation as much as possible, by demulcents and expectorants, as mucilaginous drinks and lozenges, which act upon the glottis, and sympathetically upon the trachea and bronchiæ. Among the first may be mentioned, almond milk, barley water, refined Spanish juice, gum arabic, and a mixture of the last two made into lozenges; among the second, the most innocent and convenient is ipecacuanha, in the shape of lozenges, 2 or 3 of which may be sucked whenever the cough is troublesome. A light diet should be adopted, the bowels kept *slightly* relaxed by mild aperients, and a mild and equable temperature sought as much as possible. When this plan does not succeed, recourse may be had to an emetic, followed by small doses of Dover's powders, and extract or tincture of henbane, or squill pill. When a cough is troublesome at night, and unattended with fever, a small dose of laudanum, or tincture of henbane, taken on going to rest, will generally procure sleep. In the treatment of dry cough the more stimulating expectorants are useful, as garlic, ammoniacum, styrac, and benzoin, combined with narcotics and sedatives, as henbane, hemlock, and opium. A diaphoretic opiate is also very useful, especially in the cough of old people.

COUGH, POPULAR REMEDIES FOR. I. (*Draughts.*) *a.* Sirup of poppies 1 dessert-spoonful; antimonial wine 20 drops; mix for a dose, to be taken in a little warm tea on going to bed. *b.* Laudanum 30 drops; vinegar and honey, of each, a dessert-spoonful; ipecacuanha wine 25 drops; mix for one dose, as last.

II. (*Emulsion.*) Milk of almonds 4 oz.; sirup of squills and tolu, of each, 1 oz.; mix. *Dose.* A tablespoonful every 2 hours.

III. (*Mixtures.*) *a.* Tincture of tolu ½ oz.; paregoric elixir and tincture of squills, of each, ½ oz.; sirup of white poppies 1 oz.; mix. *Dose.* 1 teaspoonful in barley water, whenever the cough is troublesome. *b.* Milk of ammoniacum 4 oz.; sirup of squills 2 oz.; mix. A tablespoonful 3 or 4 times daily, for the cough of old persons. *c.* (*Dr. Munro's.*) Paregoric ½ oz.; sulphuric ether and tincture of tolu, of each, ½ oz.; mix. *Dose.* A teaspoonful night and morning, or when the cough is troublesome, in a little warm water. *d.* (*Dr. Radcliff's.*) Sirup of poppies, sirup of squills, and paregoric, of each, ½ oz.; mix. *Dose.* As last.

COUMARINE. The fragrant volatile principle of the tonka bean, the diptera odorata of Wildenow. It is dissolved out by ether, and purified by alcohol. It crystalizes in small prisms.

COWHAGE. *Syn.* COWITCH. DOLICHIS PUBEA. The down which grows upon the pods of the mucuna pruriens. (Dolichos pruriens.) It occasions violent itching, when it comes in contact with the skin, which can only be allayed by a solution of given vitriol or oil. It is frequently administered as a vermifuge, made into a confection, by scraping the hair off a pod into treacle, sirup, or honey, for a morning dose, which is repeated for 3 or 4 successive days, followed by a brisk purge.

COWS, MILCH, (CHOICE OF.) As to a choice of breeds for a private family, none in England, (says Mr. Lawrence,) probably combine so many advantages as the Suffolk dun-cows. They excel both in quantity and quality of milk; they feed well after they become barren; they are small-sized, and polled or hornless; the last a great convenience. The horns of cows which butt and gore others, should be immediately broad tipped. There is a breed of polled Yorkshire, or Holderness cows, some of them of middling size, great milkers, and well adapted to the use of families, where a great quantity of milk is required, and where price is no object, and food in plenty. If richer milk and a comparison of the two famous breeds be desired, one of each may be selected, namely, the last mentioned, and the other of the midland county, or long-horned species. Color is so far no object, that neither a good cow nor a good horse can be of a bad color; nevertheless, in an ornamental view, the sheeted and pied stock of the Yorkshire shorthorns make a picturesque figure in the grounds.

The Alderney cows yield rich milk upon less food than larger stock, but are seldom large milkers, and are particularly scanty of produce in the winter season. They are, besides, worth little or nothing as barreners, not only on account of their small size, but their inaptitude to take on fat, and the ordinary quality of their beef.

Feeding. There is nothing equal to rich pasturage for milch cows, but at such seasons, and during such weather that this cannot be procured, good hay, with turnips, carrots, potatoes, or mangel-wurzel, must be given instead, along with a sufficient quantity of clean water. The principal cowkeepers of the metropolis have dairy-farms in the suburbs, where the animals are turned out a portion of every day in the year, except during heavy rains, or when the ground is covered with snow. They are also well supplied with brewers' grains, tares, beet-root, &c., and great care is taken that they get fresh air, and exercise sufficient for their health. Such cows yield a large quantity of wholesome milk, very different to much that is sold in London, obtained from cows kept in stables, cellars, and other confined situations, and which are seldom supplied with green food. It has lately been shown by Boussingault, that mangel-wurzel, so commonly used for feeding cattle, is insufficient as an article of food. He found that a cow fed on this substance ceases to give her usual quantity of milk, and that even when other food was given along with it, the animal yielded less than her ordinary quantity. Before giving turnips to cows, the rotten or bad ones should be picked out, as it is said that even the presence of a single damaged one will flavor the milk, and perhaps spoil a whole dairy of cheese or butter.

Economy of a cow. The annual consumption of food per cow, if turned to grass, is from an acre to an acre and a half in the summer, and from a ton to a ton and a half of hay in the winter. A cow may be allowed 2 pecks of carrots

per day. The grass being cut and carried, will economize it full ¼. The annual product of a good fair dairy cow, during seven months after calving, and either in summer or winter, if duly fed and kept in during the latter season, will be an average of 7 lbs. of butter per week, from 3 to 5 gallons of milk per day. Afterwards, a weekly average of 3 or 4 lbs. of butter from barely half the quantity of milk. It depends on the constitution of the cow, and how nearly she may be milked to the time of her calving, some giving good milk until within a week or two of that period, others requiring to be dried 8 or 9 weeks previously. I have heard (says Mr. Lawrence) of 20 lbs. of butter, and even 22 lbs., made from the milk of 1 long-horned cow in 7 days; but I have never been fortunate enough to obtain one that would produce more than 12 lbs. per week, although I have had a Yorkshire cow which milked 7 gallons per day, yet never made 5 lbs. of butter in one week. On the average, 3 gallons of good milk will make 1 lb. of butter.

CRACKNELS. *Prep.* Mix a pint of flour with a little grated nutmeg, the yelks of 2 eggs, 2 or 3 spoonfuls of rose-water, and cold water sufficient to make a paste; then roll in ½ lb. of butter, and make it into shapes. In 1 hour put them into a kettle of boiling water, and boil them until they swim, then throw them into *cold* water; take them out, and when dry bake them on tins.

CRACKNUTS. *Prep.* Flour 1 lb.; sugar ¾ lb.; melted butter ½ lb.; 6 or 7 eggs, well beaten; make a paste with a glassful of raisin wine and a little water; add caraways, roll it out as thin as paper, cut it into shapes with a tumbler, wash the pieces with the white of egg, and dust them over with powdered sugar.

CRAMP. Spasmodic or involuntary contractions of the muscles, generally of the extremities, accompanied with great pain. The muscles of the legs and feet are those most commonly affected with cramp, especially after great exertion. The best treatment is immediately to stand upright, and to well rub the part with the hand. The application of strong stimulants, as spirits of ammonia, or of anodynes, as opiate liniments, has been recommended. When cramp occurs in the stomach, a teaspoonful of sal volatile in water, or a dram glassful of good brandy, should be swallowed immediately. When cramp comes on during cold bathing, the limb should be thrown out as suddenly and violently as possible, which will generally remove it, care being also taken not to become flurried nor frightened; as presence of mind is very essential to personal safety on such an occasion. A common cause of cramp is indigestion, and the use of acescent liquors; these should be avoided, and bitters and absorbents had recourse to.

CRAYONS. Small cylinders or pencils of coloring substances, used for drawing upon paper, &c.

Prep. Crayons are commonly prepared by mixing up the color with some substance that will dilute it to a proper shade, and give it the necessary softness and tenacity to adhere readily to paper, when rubbed against it. The cylindrical form is generally given to them by means of a cylinder of 2 or 3 inches diameter, having one end open, and the other firmly secured to a perforated plate, having holes of the same size as the intended crayons. The crayon-composition, in the state of a stiff paste, is introduced into the open end, and is driven down and through the holes, by means of a small plug or piston, that exactly fits the inside of the cylinder. To impart an equable motion, which is essential to the formation of well-shaped crayons, a small screw is employed. The pieces that pass through the holes are cut into lengths and dried. All the materials employed in making crayons are previously reduced to the state of an impalpable powder, and those that are gritty are elutriated or washed over. The following are among the best formulæ for making crayons:

I. Spermaceti 3 oz.; boiling water 1 pint; agitate together till they form a species of emulsion, with which mix up bone ashes 1 lb., (previously reduced to an impalpable powder,) and coloring matter as much as is required to give the proper tint. When half dry form the mass into crayons.

II. Pipeclay, and the finest prepared chalk, equal parts; or pipeclay alone, q. s.; coloring a sufficient quantity. Make them into a paste with pale mild ale.

III. (*Process of the brothers Joel, of Paris.*) Shellac 3 parts; spirits of wine 2 parts; oil of turpentine 1 part; coloring matter and blue clay, of each 6 parts. The shellac is dissolved in the spirit, and well mixed by trituration with the clay, (previously elutriated and dried,) the colored powder, and the turpentine; the mass is then made into crayons, which are dried by a stove heat.

IV. White curd or Castile soap, cut into thin shavings, 1 oz.; boiling water 1 pint; dissolve, and when cold add gradually as much rectified spirit of wine as will barely render the liquid transparent. With this fluid make the coloring matter into a paste, along with ½ its weight each of the finest elutriated clay and chalk.

V. Shellac 5 parts; wood naphtha 10 parts; dissolve, and with this fluid mix up the coloring powder, previously stirred up with an equal weight of fine blue clay. Dry the crayons by a stove heat. If this process be well managed, it will produce crayons equal to those of the best Parisian houses.

VI. (*Colored crayons.*) Crayons may be made of any color or shade, by employing suitable pigments, and diluting them with a proper quantity of elutriated or prepared chalk. *White crayons* are made of this substance, by simply combining it with a suitable quantity of pure clay, or by mixing it up in either of the ways just described. *Black crayons* are made of prepared blacklead, ivory-black, lamp-black, &c. Black chalk is frequently made into crayons by simply sawing it into suitably-sized pieces. *Red crayons* have, as their coloring ingredients, carmine, carminated lakes, vermilion, and any of the earthy or mineral colors commonly used as pigments. General Lomet has proposed, as a superior red crayon, the softest hematite, elutriated, dried, and made into a paste with water holding in solution a little gum and soap. *Blue crayons* are made of indigo, smalts, Prussian blue, verditer, &c. *Green crayons* of a mixture of king's yellow, or yellow ochre, with blues. *Yellow crayons* of king's yellow, Naples ditto, yellow ochre, &c. *Brown crayons* of umber, (raw and burnt,) terra di sienna, (raw and

burnt,) Cullen's earth, brown ochre, &c.; and some peculiar shades, of a mixture of black, carmine, and either of the above colors. *Purple crayons* are made with any of the more brilliant blues, mixed with carmine, lake, or vermilion.

Remarks. As crayon colors do not admit of being mixed together at the time of using them, like liquid colors, it is usual to make 3 to 6 different shades of each color, so as to enable the artist at once to produce any effect he chooses.

CRAYONS, LITHOGRAPHIC. *Prep.* I. Tallow soap 7 parts; white wax 6 parts; melt by a gentle heat, add lamp-black 1 part, and cast it into moulds.

II. White wax 4 parts; shellac and hard tallow soap, of each 2 parts; lamp-black 1 part; as last.

III. Spermaceti, white wax, and hard tallow soap, of each equal parts; lamp-black to color; as last.

Use. To draw designs on lithographic stones.

CREAM. The oleaginous portion of milk, which collects in a thin stratum upon the surface, when that fluid is left undisturbed for some time. By the process of churning, it is converted into butter. When kept for some days, it becomes thicker, and partially coagulated, in consequence of the formation of some lactic acid, which precipitates the caseous matter contained in the small portion of the milk with which the cream is mixed. If cream in this state be violently shaken, as in the operation of churning, the oily portion, or butter, quickly separates, and leaves a liquid behind, called *buttermilk.* If instead of churning it, we suspend it in a linen bag, and allow it to drain, it will gradually become drier and harder by the separation of the liquid portion, and will then form what is known by the name of cream cheese. By the application of *slight* pressure, the separation of the whey is more completely effected, and the product is not only better, but will keep longer. When cream is intended for churning, it should be kept until it turns *slightly* sour, as then the butter will readily "*come;*" for if churned while quite sweet, the operation will be tedious, and frequently fail. When this happens, the dairy maids declare the milk is "*charmed,*" or "*bewitched,*" and reluctantly proceed with the operation. The cause of this is the want of acidity, which is not the case when the cream has been kept for a certain time before churning, for then a portion of the sugar contained in the serum is converted into lactic acid. The addition of a little rennet, or vinegar, is the proper remedy in this case, and will cause the almost immediate appearance of the butter.

The term "*Cream*" is also frequently applied to some compound spirits and cordial liquors, because of their cream-like smoothness and flavor.

Qual. The cream of milk may be regarded as an article of food in the same light as butter, as it is converted into the latter by the process of digestion, especially when violent exercise follows after eating it. On this account much cream should never be taken at once by persons of delicate stomachs. In eating cream with fruit, persons are hardly aware of the large quantity they consume, until they find it disagree with their stomachs, when the condiment is blamed for the indiscretion of those who take it

CREAM, ALMOND. *Prep.* Sweet almonds 2 oz.; bitter almonds 4 in number; blanch and beat them in a mortar to a *smooth paste,* adding a teaspoonful of water to prevent oiling. Mix this with a pint of cream, the juice of a lemon, and enough powdered lump sugar to sweeten; whisk up a froth, take it off and lay it on a clean sieve; then fill glasses with the liquor, and place some of the froth on the top of each.

CREAM, BRANDY. *Prep.* Mix a teacupful of almond cream with ½ a pint of milk; boil for 2 minutes, and when cold, add the yelks of 6 eggs and a quart of cream; heat it gently over the fire until it thickens, keeping it well stirred; then add 2 or 3 glasses of brandy, and pour it into small cups or shallow glasses.

CREAM, BURNT. *Prep.* Cream 1 quart; cassia a small stick; the peel of half a lemon; boil for 5 minutes; let it cool a little and take out the spice; then add the yelks of 9 eggs, and sugar to sweeten; stir until cold, put it into a dish, strew powdered sugar over it, and bake it until brown.

CREAM, COLD. *Syn.* GALEN'S CERATE. CERATUM GALENI. *Prep.* I. Oil of almonds 1 lb.; white wax ¼ lb.; melt together in a water-bath, strain, if necessary, and add by degrees rose water (made warm) ¾ pint; stir assiduously until cold.

II. Olive oil and rose water, of each 1 pint; spermaceti and white wax, of each 4 oz.; as last.

III. White lard 1 lb.; spermaceti ¼ lb.; orange flower water ½ pint; as last.

Remarks. The above may be further scented by the addition of any fragrant essence or oil, if desired. It is used as a mild unguent to soften the skin, prevent chaps, &c.

CREAM, COLD, (HUDSON'S.) *Prep.* Oil of almonds 4 oz.; white wax and spermaceti, of each ½ oz.; rose water 4 oz.; orange flower water 1 oz.; as last.

CREAM, COSTOPHIN. Named after a village near Edinburgh, where it is commonly made. *Prep.* Put the milk of 3 or 4 consecutive days, together with the cream, into a vessel, and allow it to remain until sour and coagulated. The whey must be now drawn off, and fresh cream added. It is eaten with sugar and fruit, especially strawberries and raspberries.

CREAM, DEVONSHIRE RAW. Sour cream mixed with an equal quantity of fresh cream, and sweetened with sugar. Eaten with fruit.

CREAM, DEVONSHIRE SCALDED. *Syn.* CLOUTED CREAM. *Prep.* Set the milk of yesterday in a polished shallow brass pan, over a charcoal or other clear fire, free from smoke, and gradually heat it very hot, but be careful not to let it boil. It is readily known to be done enough when the undulations on the surface look thick, and form a ring round the top of the fluid, the size of the bottom of the pan. Let it cool, and the next day skim off the cream. It is eaten with sugar and fruit, and is made into butter.

CREAM, D'ILLOTTE'S VEGETABLE. *Syn.* CRYSTALLIZED CREAM. *Prep.* Oil of almonds 2 oz.; spermaceti ½ oz.; melt and add bergamotte, neroli, and verbena, of each 5 drops; huile au jasmin 10 drops. Stir well together, and pour it into small wide-mouthed bottles to crystal-

lise. If preferred harder, 1 drachm more spermaceti may be used.

CREAM, FOR ICING. *Prep.* I. New milk 2 pints; yelks of 6 eggs; white sugar 4 oz.; mix, strain, heat gently, and cool gradually. Ice as wanted. Used to make ice creams.

II. Cream 1 pint; sugar 4 oz. Mix. As above.

CREAM, FRUIT. *Prep.* Pulped or preserved fruit 1 lb.; cream, or good raw milk, 1 quart; sugar sufficient; boil for 1 minute; cool, and add a glass of brandy.

CREAM, FURNITURE. *Prep.* Pearlash 2 oz.; water half a gallon. Dissolve and filter, add white wax 4 oz., and boil until dissolved.

II. Soft water 1 gallon; beeswax 1 lb.; soap ½ lb.; pearlash 2 oz. Boil until dissolved.

Use. To polish furniture, varnish wood-work, statues, &c. It is diluted with water, and spread upon the surface with a painter's brush, then polished off with a hard brush, cloth, or leather.

CREAM, ICE. *Proc.* About half fill the icing pot with the mixture which it is desired to freeze, place it in a pail or any suitable wooden vessel, with ice beat small, and mixed with about half its weight of common salt; turn it backwards and forwards as quickly as possible, and as the ice cream sticks to the sides, break it down with an ice spoon, so that the whole may be equally exposed to the cold. As the salt and ice in the tub melt, add more, until the process is finished, then put the cream into glasses, and place them in a mixture of salt and ice until wanted for use. Before sending them to table, dip the outside of the glass into lukewarm water, and wipe it dry.

Remarks. Flavored ice-creams are made by mixing "*cream for icing*" with half its weight of mashed or preserved fruit, previously rubbed through a clean hair sieve; or, when the flavor depends on the juice of fruit or on essential oil, by adding a sufficient quantity of such substances. Thus raspberry and strawberry ice-creams are made according to the former method; lemon, orange, noyeau, and almond ice-creams, by the latter method. In the same way any other article besides cream may be frozen.

CREAM, IMITATION *Syn.* Mock Cream. Substitute for ditto, &c. *Prep.* I. Beat 2 eggs, 1 oz. of sugar, and a small piece of butter, with a pint of warm milk, then put it into hot water and stir it one way, until it acquires the consistence of cream.

II. Instead of eggs, as above, use a spoonful of arrow-root, first well beaten with a little cold milk.

CREAM, LEMON. *Prep.* Cream 1 pint; yelks of 3 eggs; powdered sugar 6 oz.; the yellow rind of 1 lemon, (grated,) with the juice; mix, apply heat, and stir until cold. If wanted white, the whites of the eggs should be used instead of the yelks.

CREAM, ORANGE. *Prep.* Similar to lemon cream.

CREAM, PAINTER'S. *Prep.* Pale nut oil 6 oz.; mastich 1 oz.; dissolve, add sugar of lead ½ oz., previously ground in the least possible quantity of oil; then add water gradually until it acquires the consistence of cream, working it well all the time. Used by painters to cover their work, when they are obliged to leave it for some time. It may be washed off with a sponge and water.

CREAM, PISTACHIO. *Prep.* Beat ½ lb. of pistachio nut kernels in a mortar with a spoonful of brandy. Put them into a pan with a pint of good cream and the yelks of 2 eggs, beaten fine. Stir it gently over the fire till it grows thick, and then put it into glasses or a China soup plate. When it is cold, stick it over with small pieces of the nuts, and send it to table.

CREAM, RASPBERRY. *Prep.* Rub a quart of the fruit through a hair sieve to extract the seeds, then mix it with the cream, sweeten with sugar, and raise a froth thereon with a chocolate mill. Take this off, and place it on a hair sieve, then fill your glasses with the cream, and place some of the froth upon the top of each. The expressed juice of raspberries also makes a delicious cream. In winter, raspberry jelly, jam, or sirup, may be used. A glass of good brandy improves this cream.

CREAM, STONE. *Syn.* Cream Blancmange. *Prep.* Dissolve isinglass ½ an oz. in water a teacupful; add cream 1 pint, and sugar 4 oz.; heat it boiling hot and stir until nearly cold, then pour it over some fruit or preserves, placed on the bottom of glass dishes.

CREAM SIRUP. Finely powdered lump sugar mixed with an equal weight of cream. It will keep for a long time if put into bottles and closely corked and sealed over. It is commonly placed in 2 oz. wide-mouthed vials, and taken on long voyages, a fresh vial being opened at every meal.

CREAM, SCOTCH SOUR. *Prep.* Put skimmed milk over night in a wooden tub with a spigot at bottom, and put this tub into another filled with hot water; in the morning take out the small tub and draw off the thin part of the milk (*wigg*) until the thick sour cream begins to come. This process requires practice as to the heat of the water; when it succeeds, skimmed milk yields nearly one half of this cream, which is eaten with sugar as a delicacy; it is only distinguishable from cream by its taste, and sells for double the price of fresh milk. (Gray.)

CREAM, VANILLA. *Prep.* I. Boil a stick of vanilla, (grated,) and half an oz. of isinglass, in a pint of milk, until the latter is dissolved; strain and add sugar 6 oz., and cream 1 pint; stir till nearly cold, then pour it into moulds like blancmange.

II. Cream and isinglass jelly, of each 1 pint; sugar 6 oz.; essence of vanilla ½ oz.; mix as before.

CREAM, VELVET. As the last, but, instead of vanilla, flavor with the rind and juice of 1 lemon, and about a teacupful of white wine. Mould like blancmange.

CREAM, WHIPT. *Prep.* Whites of 12 eggs cream 1 quart; pale sherry ½ a pint; essence of musk and ambergris, of each 10 drops; essence of lemon and orange peel, of each 3 or 4 drops; whisk to a froth, remove the latter on to a sieve, fill the glasses with the cream, and then pile the froth on the top of them. Very fine.

CREME. (*Fr.*) Cream. This name is applied to several compound spirits and cordial liquors, especially by the French liquoristes, who pride

themselves on the superior quality and cream-like smoothness of their manufactures. Like the cordials of the English, they are mostly dilute spirit, aromatized and sweetened.

CREME D'ANISE. The same as aniseed cordial.

CREME DES BARBADES. *Prep.* I Lemons sliced 2 dozens; citrons sliced ½ dozen; fresh balm leaves 8 oz.; proof spirit 4 gallons; digest for a fortnight, then express the liquor, strain, and add 2 gallons each of clarified sirup and pure water.

II. The fresh peels of three oranges and 3 lemons; cassia bruised 4 oz.; mace, pimento, and cloves, of each 1 dr.; rum, at proof, 2½ gallons; digest as before, distil over 2 gallons, and add clarified sirup 1 gallon. If wanted weaker, lower with clear soft water.

CREME DE CACAO. *Prep.* Infuse roasted caracca cacao nuts (cut small) 1 lb., and vanilla ¼ oz., in brandy 1 gallon, for 8 days; strain, and add 3 quarts of thick sirup.

CREME D'ORANGE. *Prep.* Oranges, sliced, 3 dozen; rectified spirit 2 gallons; digest for 14 days; add lump sugar 21 lbs. (previously dissolved in water 4½ gallons;) tincture of saffron 1½ oz.; and orange-flower water 2 quarts; mix well, and strain.

CREME DE PORTUGAL. *Prep.* Proof spirit 1 quart; essence of lemon 30 drops; essential oil of almonds 5 drops; mix; then add clarified sirup 1½ pint; and water ½ pint.

CRENIC ACID. A brown acid, discovered by Berzelius, in certain mineral waters. It is a modification of humus, produced by the decay of vegetable matter. Apocrenic acid is nearly similar.

CREOSOTE. *Syn.* Creasote. Kreasote. Kreosote. Creasoton, (P. L.) Creazotum, (P. E.) This substance is a product of the dry distillation of organic bodies, and the peculiar preservative principle of smoke and pyroligneous acid. It prevents the decomposition of meat, and thence its name from κρέας, *flesh*, and σώζειν, *to preserve*. It was discovered by Reichenbach. It is manufactured from wood-tar, in which it is sometimes contained to the amount of 20 per cent., and from crude pyroligneous acid and pyroxilic oil. Its components are carbon, hydrogen and oxygen, in a proportion not yet precisely ascertained.

Prep. (*Process of M. Simon.*) A copper still, capable of containing 80 Berlin quarts, is filled to one third with the oil of wood-tar, and distilled. First, the more volatile matters pass over. These do not contain creosote, and are, therefore, to be rejected; but when, by the gradually increased temperature, there passes over a very acid fluid, which becomes turbid, and at the same time an oil separates therefrom when mixed with water, the product must be collected, and the distillation continued until the operator notices a squirting in the still, when the process is interrupted. The distilled product is then nearly saturated with potassa, returned to the still, which must have been previously cleansed, and should be now half filled with water, when distillation must be recommenced. At first an oil comes over, which floats on water, and which consists chiefly of eupione, for which reason it is useless for preparing creosote. As soon, however, as the oil begins to sink in the water which comes over with it, it is charged with creosote, and should be carefully collected. The distilling *aqueous* fluid should be reintroduced, from time to time, into the still, and the distillation continued so long as any oil continues to come over with it. The distilled oily fluid is now dissolved in liquor potassæ, sp. gr. 1·120. That which remains undissolved is eupione, and must be skimmed off. The solution of creosote in potassa contains, however, a considerable portion of eupione, which dissolves therein. The greater portion of this may be separated by dilution, and distilling with an equal quantity or five-fourths of its volume of water, pure water being added from time to time, so long as any eupione comes over with the distilled liquor. When eupione has ceased to pass over, sulphuric acid is poured into the still in quantity exactly sufficient to saturate ½ of the potassa employed, and the distillation is then renewed. Creosote then distils, the first portions of which, however, still contain eupione, after which pure creosote follows; that is to say, "a creosote which, when mixed with 6 or 8 times its quantity of a solution of pure potassa, furnishes a mixture which, by the addition of any further quantity whatever of water, does not become turbid." The combination of creosote remaining in the still is now mixed with sulphuric acid in slight excess, and the distillation renewed, the water coming over at the same time is from time to time returned into the still; and when no further oil passes over with the water, the process is complete. The creosote thus obtained is redistilled with the water which has passed over with it, while the distilled water is meanwhile, from time to time, poured back into the still. The creosote thus obtained is then colorless; but it contains a considerable quantity of water in solution, which is separated by distillation in a glass retort. The water distils first, and then creosote, which, after cleaning the neck of the retort from the water, must be received in another dry receiver. If the creosote assumes a red color after being exposed for some time to the air, it must be redistilled, and then it keeps very well. Korne found that tar, prepared from turf, furnishes much more creosote than that from fir-wood, &c. &c. (Berzelius' Lehr. and Ann. Chym.)

Pur. The fluid commonly sold in the shops for creosote, is a mixture of creosote, picamar, and light oil of tar. Pure creosote has a specific gravity of 1·037, and boils at 397° F. It is perfectly soluble in both acetic acid and liquor of potassa. If shaken with an equal volume of water in a narrow test tube, not more than the 80th part disappears; otherwise it contains water, of which creosote is able to assume $\frac{1}{10}$, without becoming turbid. If it can be dissolved completely in 80 parts by weight of water, at a medium temperature, it then forms a perfectly neutral liquid. An oily residue floating on the surface betrays the presence of other foreign products, (eupione, capnomore, picamar,) which are obtained at the same time with the creosote during the dry distillation of organic substances.

The specific gravity of picamar is 1·095, of paraffine 0·87, of capnomore 0·977, and of eupione 0·655. The first of these is readily detected by agitating the sample with strong liquor of potassa,

when, if it be present in any quantity, the mixture will solidify into a mass of crystals in 24 hours. Eupione may be discovered by its partial solubility in liquor of potassa.

Prop. Creosote is a colorless and transparent liquor, but little heavier than water, of a peculiar, unpleasant, penetrating odor, and a very pungent and caustic taste; acts in a state of concentration like a poison, makes the eyes feel painful, boils at 390° F., does not consolidate even at —5° F.; produces on paper greasy spots, which afterwards disappear; dissolves in 80 parts of water, and mixes in any proportion with spirit of wine, ether, essential and fat oils, acetic acid, ammonia, and potassa. It dissolves iodine, phosphorus, sulphur, resins, and the alkaloids. The aqueous solution is neutral, and precipitates solutions of gum and the whites of eggs.

Uses. Creosote is recommended for *internal* use against several diseases of the channels of digestion and the organs of respiration, against rheumatism and gout, torpid nervous fever, spasms, diabetes, tapeworm; in the form of pills; with the juice of Spanish liquorice as an emulsion; as an ethereal or spirituous solution; *externally*, against chronic diseases of the skin, sores of different kinds, mortification, scalding; wounds, as a styptic; caries of the teeth, and toothache thereby produced, mostly in the form of an aqueous solution, (1 to 80;) for poultices, lotions, and injections; and likewise, mixed with lard (5 drops to 1 dr.) as an ointment; and, dissolved in spirits of wine, as a popular remedy for toothache. The opinions as to the effects of creosote, as an internal remedy, are divided, obviously because, as is generally the case with new remedies, too much was expected from it, and it has therefore been employed in the most opposite diseases. It is doubtless most effective in the cases named as an external remedy. (Duflos's Pharm. Chym.) Creosote is also employed to preserve animal substances, either by washing it over them, or by immersing them in its aqueous solution. A few drops in a saucer, or on a piece of spongy paper, if placed in a larder, will effectually drive away insects, and make the meat keep several days longer than otherwise. A small quantity added to brine or vinegar is commonly employed to impart a smoky flavor to meat and fish, and its solution in acetic acid is used to give the flavor of *whiskey* to *plain spirit.*

CRICKETS. These insects may be destroyed by putting Scotch snuff into their holes, or, by placing some pieces of beetle wafers for them to eat.

CROUP. An inflammatory disease affecting the larynx and trachea.

Symp. A permanently laborious and suffocative breathing, accompanied by wheezing, cough, a peculiar shrillness of the voice, more or less expectoration of purulent matter, which continually threatens suffocation. This disease has been divided by nosologists into acute and chronic croup. The latter is very rare.

Treat. Bleeding by leeches, or cupping over the region of the trachea, should be immediately had recourse to, when the symptoms are urgent; or violent local irritants, as pieces of lint dipped in strong acetic acid, or blisters may be applied to the same part. In weakly subjects of irritable constitution, bleeding should be avoided. Dr. Laroque recommended repeated vomiting, in the croup of children, and M. Marotte and M. Boudet adopted this plan with great success. This treatment consists in making the children attacked with croup, vomit a great number of times within twenty-four hours, so as to detach the pseudo-membrane from the larynx as fast as it is formed. For this purpose, M. Marotte employed one or other of the following formulæ:

I. Tartar emetic 00·10 gram.; sirup of ipecacuanha 30·00 gram.; water 60·00 gram.

II. Impure emetine 00·20 gram.; sirup of ipecacuanha 60·00 gram.; water 30·00 gram.

He administered these draughts by spoonfuls every ten minutes, until there had been a sufficient number of vomitings; in this manner, he was always able to make them expectorate a certain quantity of false membrane. This treatment was adopted conjointly with the use of fractional doses of calomel, leeches to the neck, and blisters to the nape of the neck; but it is the opinion of M. Marotte that the vomitings produced the curative effects. M. Boudet observes, that out of 25 cases that occurred at the Hôpital des Enfans, the only authenticated case of cure, among all these, was effected by *vomitives.* (Gaz. Méd. de Paris, 1842.)

Remarks. The croup is a very dangerous disease, and medical aid should be *immediately* sought wherever it can be procured. It is principally confined to infancy, or to children under 9 years old, but occasionally attacks adults.

CRUCIBLES. *Syn.* SCHMELZTIEGEL, (*Ger.*) CREUSETS, (*Fr.*) Conical-shaped vessels made of clay, and employed to hold substances submitted to a strong heat. Some crucibles will bear the most intense heat of the blast furnace.

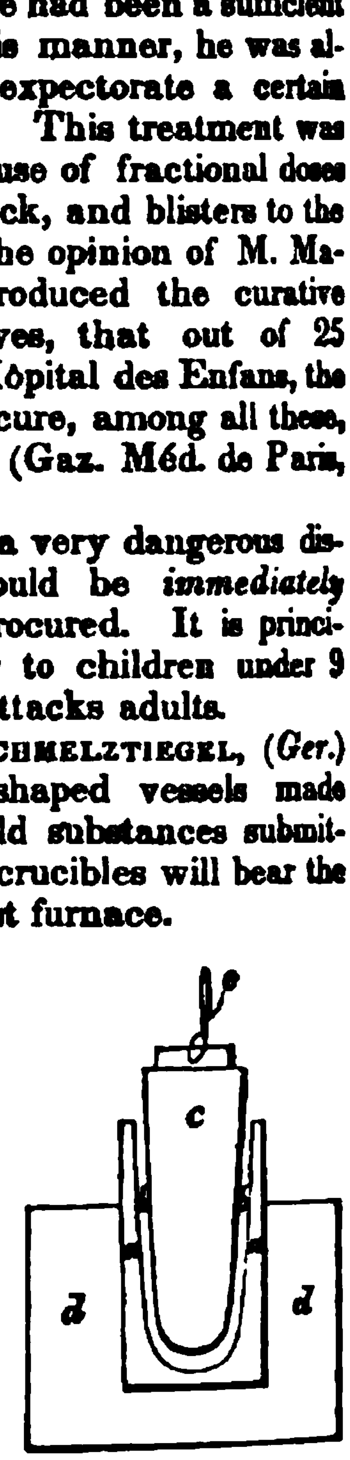
a a, External steel mould.

b b, Clay or composition for forming the crucible.

c, Internal steel mould.

d d, Wooden stand.

e, Cord or chain to withdraw the internal mould or plug.



Manuf. There are two ways of making crucibles: one by forcibly shaping the ingredients in a double mould, (see engraving;) the other, by pouring the "*slip*," of the consistence of cream, into porous moulds, made of a species of stucco. In the latter case, a series of the moulds are placed upon a table and *filled* with the semifluid composition. By the time this operation is finished on 50 or 60 moulds, the workman returns to the first one filled, and alternately pours the slip out of them, leaving only a very small quantity behind to give the requisite thickness to the bottom. In each of the moulds so filled, a perfect crucible is formed, by the abstraction of the water of that portion of the "slip" in immediate contact with the stucco, and the crucible will be either thicker or thinner, in proportion to the time this absorbent action has been allowed to go on. 70 or 80 cruci-

bles may thus be made in less than 15 minutes. The moulds and their contents are next placed in a stove or slow oven. In a short time from the contraction of the clay in drying, the crucibles may be readily removed, and the moulds, as soon as they have become dry, may be again filled, and by care will last for years. As soon as the crucibles, formed by either of the above methods, have become *perfectly* dry, they are ready for baking, which is performed by exposing them to heat in a potter's kiln.

The compositions, of which crucibles are made, differ according to the uses for which they are intended. The following may be taken as good specimens.

I. (*Berlin.*) Stourbridge clay 8 parts; cement (old crucibles ground to a fine powder) 3 parts; coak 5 parts; graphite 4 parts. Will resist the greatest heat, and bear being repeatedly heated and cooled without cracking.

II. Stourbridge clay 4 parts; cement 2 parts; coak powder and pipeclay, of each 1 part. Suitable for the crucibles used by brassfounders.

III. (*Hessian.*) Clay, (containing 10§ of silica and a *little* of the oxides of iron and manganese;) sand, (containing 2§ of alumina, and 1·5§ of the above metallic oxides, and nearly 1§ of lime.) (Wurzer.)

IV. (*Blacklead.*) Fine clay 1 part; graphite 2 parts; mix well. This composition bears a great heat and sudden changes of temperature, and the vessels made with it have the advantage of smoothness of surface. It is excellent for forming portable furnaces, &c.

V. (*Anstey's patent.*) Raw Stourbridge clay 2 parts; hard gas coak (previously ground and sifted through a sieve, of ⅛ inch mesh) 1 part. The crucibles formed with this composition are only *dried*, and *not baked*. When wanted for use they are warmed, placed on the furnace, bottom upwards, the burning coak gradually heaped round them, and the firing continued until they acquire a full red heat. They are now turned and charged with cold iron. These pots will stand 15 or 16 meltings, but are liable to crack by cooling.

CRUMPETS. *Prep.* Make 2 lbs. of flour into a dough with some warm milk and water, adding a little salt, 3 eggs, well beaten, and 3 spoonfuls of yeast; mix well, and reduce it with warm milk and water to the consistence of *thick* batter; place it before the fire to rise, then pour it into buttered tins, and bake it slowly to a fine yellow.

CRUST, (IN COOKERY.) The paste with which pies, tarts, &c., are covered, or made.

I. (*Fine.*) Flour 1 lb.; sugar ¼ lb.; melted butter ½ lb.; 3 eggs. Requires but little baking.

II. (*Raised crust for meat pies, &c.*) As the last, except using 6 oz. of lard for the butter, and 2 instead of 3 eggs.

III. (*Short.*) Flour 1 lb.; butter and sugar, of each 2 oz.; eggs 2 in number. Make a stiff paste.

CRYSTALLIZATION. (From κρυσταλλος, a crystal.) The formation of crystals. When fluid substances are suffered to pass with adequate slowness to the solid state, or when solutions of solids are slowly concentrated by evaporation, or the solvent powers of the menstruum, gradually lessened by cooling, the ultimate particles of matter frequently so arrange themselves as to form regular geometrical bodies, familiarly known by the name of crystals. This wonderful property, which is possessed by a great variety of substances in the mineral kingdom, and by most saline bodies, is resorted to for many useful and important purposes in the chemical arts. It is by means of crystallization that the majority of salts are obtained in a state of purity; for in the act of passing into the crystalline state, the foreign substances, with which they are united, are left behind in the "*mother water.*" By repeating the process 2 or 3 times, they are usually rendered quite pure.

Solids are obtained in a crystalline state by melting them, and placing them in a situation where they will cool very slowly. Thus iodide of sulphur is crystallized by melting it in a flask placed in a salt water bath, and allowing it to remain in the water until the latter becomes cold. Sulphur and many metals are crystallized by pouring them in a state of fusion into a hot vessel, having a plug in the bottom, which is withdrawn as soon as the surface becomes cool, when the liquid portion runs out and leaves the under surface in the form of a mass of agglomerated crystals. Perfectly pure wax, stearine, and spermaceti, have a very pleasing appearance when treated in this way.

Salts are crystallized, either by allowing their hot and saturated solutions to cool slowly, or by simply evaporating the menstrua until crystals are obtained. In the first case, the liquid is commonly evaporated until a pellicle forms upon the surface, when it is set aside in some sheltered situation until cold: in the second case, the solution is concentrated until it ceases to yield crystals, and these are usually removed from the liquid as soon as they are deposited. The former method is adopted for those salts that are considerably more soluble in hot than in cold water, as carbonate of soda, Epsom salts, &c.; the latter method for those that possess nearly equal solubility in both cases, and also for many salts which are not required in handsome crystals; thus, common salt and chromate of potash are crystallized in this way. Many of the alkaloids, and their salts, are obtained in crystals, by allowing their solutions (generally alcoholic or ethereal) to evaporate spontaneously.

CUBEBIN. A peculiar substance, obtained from cubebs, (piper cubeba.)

Prep. Submit the cubebs to distillation to expel the oil, dry, make a strong alcoholic tincture, and evaporate the latter to one fourth, filter, and again evaporate nearly to dryness. Leave the residuum in a cold place, until it assumes a semi-crystalline appearance, then place it on a linen strainer, and allow the fluid portion (the cubebin of M. Cassola) to drain off. In 24 hours, dissolve the substance left upon the filter in 4 times its weight of boiling alcohol of 0·90, allow the solution to deposite its undissolved resin, (still maintaining nearly the boiling temperature,) and decant the clear portion. Crystals will be deposited on cooling, which is the cubebin of Soubeiran, Capitaine, and Steer. It may be purified by re-solution in boiling concentrated alcohol, the addition of a little boiling water, and animal charcoal, and filtering, when long white needles will be deposited, if the solution be allowed to cool very slowly.

Remarks. M. Monheim has described, under

the name of cubebine, a volatile substance, but the above is the article to which this term is now universally applied. It is insoluble in water, and nearly so in cold alcohol, but very soluble in boiling alcohol. Its physiological action has been but little studied.

CURRY. A noted dish in Indian cookery, prepared in great variety, of which our space will only allow two or three examples.

I. (*The King of Oude's.*) Take ½ lb. of fresh butter, 2 large onions, 1 gill of good gravy, (veal is the best,) 1 large, piled tablespoonful of curry-powder; add to these ingredients any kind of meat cut into pieces. Put the whole into a stewpan, cover it close, and gently simmer for 2 hours. When ready to serve up, squeeze as much lemon-juice as will give it an acid flavor. (New System of Cookery. Murray.)

II. (*Dopeeaza Curry.*) Skin a fowl, and disjoint it, take 2 oz. of coriander-seed freed from the husks, and rub it perfectly smooth in a mortar, with 1 drachm of red pepper, and half a dozen onions. Set ¼ lb. of butter on the fire, and slice in an onion; when the onion is well browned, take it out, and put in the fowl; let it fry until it is brown, then mix 1 pint of curds with the onions and coriander-seed, and add it to the stew; slice in a sour apple, and keep stirring to prevent the stewpan burning, adding a little water occasionally should the curry become too dry. When the apple is tender, the curry is sufficiently done, and may be served up.

III. (*Lord Clive's.*) Slice 6 onions, 1 green apple, and 1 clove of garlic; stew them in a little good stock until they will pulp, then add 1 teaspoonful of curry-powder, a few tablespoonfuls of stock, a little salt, and a little cayenne pepper, half a saltspoonful of each; stew in this gravy any kind of meat cut into small pieces, adding a piece of butter, the size of a walnut, rolled in flour.

CUSTARDS. (In the art of the Cook and Confectioner.) A species of sweetmeat, consisting principally of milk or cream, thickened with eggs, and flavored.

I. (*Almond.*) Blanched sweet almonds 4 oz.; beat them to a smooth paste in a mortar, and add it to 1 pint of thick cream, with the yelks of 4 eggs, 2 or 3 spoonfuls of rose water, and 2 drops each of essential oil of almonds and essence of lemon. Stir the whole over a slow fire, until of a proper consistence, then pour it into cups. Some use milk instead of cream, and 2 eggs in addition to the above.

II. (*Baked.*) Mix cream 1 pint with 4 eggs, flavor with mace, nutmeg, and cinnamon, and add a little white wine, rose water, and sugar; bake.

III. (*Lemon.*) Boil ½ pint of new milk, with a piece of lemon-peel, 1 bitter almond, and 8 lumps of white sugar. Should cream be employed instead of milk, there will be no occasion to skim it. Beat the yelks and whites of 3 eggs, strain the milk through coarse muslin, or a hair-sieve; then mix the eggs and milk very gradually together, and simmer it gently on the fire, stirring it until it thickens.

IV. (*Orange.*) Boil very tender the rind of half a Seville orange, and beat it in a mortar until it is very fine; put to it a spoonful of brandy, the juice of a Seville orange, 4 oz. of loaf sugar, and the yelks of 4 eggs. Beat them all together for 10 minutes, and then pour in by degrees 1 pint of hot cream; beat them until cold, and put them in custard cups, in a dish of hot water; let them stand till they are set, then take them out and stick preserved orange-peel on the top; this forms a fine flavored dish, and may be served up hot or cold.

V. (*Rice.*) Boil ½ a cupful of the best ground rice in a pint of milk until dissolved, then mix it with a quart of cream, flavor with nutmeg, mace, and a little brandy, and put it into cups or a dish.

CUTS. *Treat.* The divided parts should be drawn close together, and held so with small pieces of strapping or adhesive plaster stretched across the wound. If the part be covered with blood, it should be first wiped off with a sponge. When the wound is large, and the parts much exposed, a good method is to sew it up. The application of a little creosote will generally stop local bleeding, provided it be applied to the clean extremities of the wounded vessels. A good way is to place a piece of lint, moistened with creosote, on the wound previously wiped clean, or to pour a drop or two of that liquid upon it. Friar's balsam, quick drying copal varnish, tincture of galls, copperas water, black ink, &c., are popular remedies applied in the same way. A bit of the fur plucked from a black *beaver* hat, is an excellent remedy to stop the bleeding from a cut produced by the razor in shaving.

CUTTINGS. (In Horticulture.) The choice of cuttings should be made from the side shoots of trees and plants, and, when possible, from such as recline towards the ground, observing to leave a little wood of a former year or season's growth attached to them, as such are found to take root more readily than when they are wholly composed of new wood. The time to take cuttings is as soon as the sap gets into full motion. Before setting them they should be cut across, just below an eye or joint, with as smooth a section as possible, observing not to injure the bud. The superfluous leaves may be removed, but a sufficient number should be left on for the purposes of vegetation. The common practice of removing *all* or *nearly all* the leaves of cuttings is injudicious. In some cases leaves alone will strike root. When cuttings are set in pots, they should be so placed as to reach to the bottom and touch the sides throughout their whole length, when they will seldom fail to become rooted plants. In the case of tubular stalked plants, it is said to be advantageous to insert both ends into the soil, each of which will take root, and may then be divided, when two plants will be produced instead of one. An *equable temperature*, a *moist atmosphere*, a *shady situation*, and a *moderate* supply of water, are the principal requisites to induce speedy rooting. Excess of any of these is prejudicial. When the size of the cuttings admits, it is better to place them under a hand or bell glass, which will preserve a constant degree of heat, and prevent evaporation from the surface of the leaves, which is the most common cause of their dying, especially in hot, dry weather.

CYANATES. Compounds formed by the union of the cyanic acid with the bases. They

are distinguished by evolving the odor of cyanic acid, accompanied by effervescence, when treated with dilute mineral acids, and by this solution, mixed with hydrate of lime, evolving ammonia. The alkaline cyanates are soluble, the others insoluble.

The *basic cyanate of ammonia* is formed by mixing dry ammoniacal gas with the vapors of hydrated cyanic acid. It forms a white, woolly, semi-crystalline mass. By heat, or exposure to the air, it is converted into urea. *Cyanate of potassa* may be formed by roasting, at a red heat, dry ferrocyanide of potassium, in fine powder, upon an iron plate, constantly stirring, until it becomes fused into one mass, when it must be reduced to fine powder, and digested in boiling alcohol, from which crystals of the cyanate will be deposited as the solution cools. A mixture of the ferrocyanide of potassium, with half its weight of peroxide of manganese, may also be used to produce this salt. The compound should be kindled by a red-hot body, and allowed to smoulder away, after which it may be treated with alcohol as before. (See UREA.) The *cyanates of silver lead*, and many other metals, may be made by adding a solution of cyanate of potassa to another of a neutral salt of the base.

CYANIC ACID. A compound of cyanogen and oxygen, discovered by Wöhler. It is only known in the hydrated state, or united to 1 atom of water.

Prep. I. Distil dry cyanuric acid, or cyamelide, in a retort, and collect the product in a well-cooled receiver. It is also formed when cyanogen is transmitted over carbonate of potassa heated to redness; a cyanate of potassa results.

II. Pass a current of sulphureted hydrogen gas through water in which cyanate of silver is diffused. (Liebig.) This acid reddens litmus strongly; is sour to the taste; it possesses the smell which is always perceived when any of its salts are decomposed by an acid; it neutralizes bases perfectly, forming salts called cyanates, but when in contact with water it suffers decomposition in a few hours, and is converted into carbonic acid gas and ammonia. The sulphureted hydrogen must not be passed so long as to decompose all the cyanate of silver; for then the cyanic acid is converted into other products by the excess of the sulphureted hydrogen.

CYANIDE. *Syn.* CYANURET. A compound of cyanogen and a metal. (See CYANOGEN and HYDROCYANIC ACID.)

CYANIDE OF GOLD. *Syn.* TERCYANIDE OF GOLD. PERCYANIDE OF DITTO. *Prep.* I. Add pure cyanide of potassium to a solution of gold in aqua regia, carefully deprived of all excess of acid by evaporation; collect the yellow precipitate.

II. Add a boiling solution of 24 parts of bicyanide of mercury to another of 16 parts of gold, dissolved in aqua regia, evaporate to dryness, and wash with pure water.

Remarks. This salt has been introduced into the French Codex, and has been used, both externally and internally, in scrofulous and similar affections. *Dose.* $\frac{1}{12}$ to $\frac{1}{10}$ of a grain, made into a pill.

CYANIDE OF MERCURY. *Syn.* BICYANIDE OF MERCURY. HYDRARGYRI BICYANIDUM, (P. L.) HYDRARGYRI CYANURETUM, (P. D.) PRUSSIAN MERCURY. PRUSSIATE OF MERCURY. HYDROCYANATE OF DITTO. CYANURET OF DITTO. CYANODIDE OF DITTO. CYANURE DE MERCURE, (*Fr.*) *Prep.* (*Proc.* of the L. Ph.) Percyanide of iron ℥viij; binoxide of mercury ℥x; distilled water 4 pints. Boil for half an hour, strain, and evaporate that crystals may form.

II. (*Winckle's process.*) Saturate dilute hydrocyanic acid with binoxide of mercury; evaporate and crystallize.

Pur., &c. It should be "transparent and totally soluble in water. This solution, on the addition of muriatic acid, evolves hydrocyanic acid, known by its smell, and a glass moistened with a solution of nitrate of silver, and held over it, gives a deposite soluble in nitric acid. When heated it evolves cyanogen, and runs into globules of metallic mercury." (P. L.) The cyanogen may be recognised by burning with a violet-colored flame. A solution of bicyanide of mercury, gives a black precipitate with sulphureted hydrogen, and white pearly crystalline plates, with iodide of potassium.

Uses, &c. It has been administered in some hepatic and skin diseases, and has been proposed as a substitute for corrosive sublimate. (Parent.) It is principally used as a source of prussic acid. *Dose.* $\frac{1}{16}$ to $\frac{1}{8}$ gr., in pills or alcoholic solution; as a *gargle* or *lotion*, 10 grs. to water 1 pint; as an *ointment*, 10 or 12 grs. to lard 1 oz.

CYANIDE OF POTASSIUM. *Prep.* I. Treat a saturated alcoholic solution of pure potassa, with the vapors of hydrocyanic acid, as long as it throws down a white crystalline precipitate, which must be collected and washed with alcohol.

II. Add hydrocyanic acid in excess to a concentrated solution of pure potassa; evaporate until crystallization commences, then pour it into a porcelain vessel and fuse at a red heat.

III. Expose well-dried and powdered ferrocyanide of potassium to a strong red heat in a close vessel. When cold, powder, place it in a funnel, moisten with a little alcohol, and wash with cold water. Evaporate the solution thus formed to dryness, expose it to a red heat in a porcelain dish, cool, powder, and boil in alcohol of 60§. As the spirit cools, crystals of cyanide of potassium will be deposited.

Remarks. When pure, this salt is colorless and odorless; when exposed to the atmosphere, moisture is absorbed, and it acquires the smell of hydrocyanic acid. If it effervesces with acids, it contains carbonate of potassa, and if it be yellow, it contains iron. It is employed in chemical analyses, and for the preparation of hydrocyanic acid; cyanide of soda may be made in the same way.

CYANIDE OF SILVER. *Syn.* ARGENTI CYANIDUM, (P. L.) *Prep.* Add dilute hydrocyanic acid to a solution of nitrate of silver, as long as a precipitate falls down; wash and dry. The proportions ordered by the London College, are nitrate of silver ℥ij and ʒij, dissolved in water 1 pint; dilute hydrocyanic acid, q. s.

Remarks. Cyanide of silver is white, soluble in ammonia, and decomposed by contact with neutral vegetable substances. By exposure to light it turns violet-colored. It has been given in some com-

plaints, in doses of one-tenth to one-eighth of a grain, (Serre,) and has been proposed as a source of hydrocyanic acid. (Everitt.)

CYANIDE OF ZINC. *Prep.* Dissolve metallic zinc in hot acetic acid, and add hydrocyanic acid as long as a precipitate falls.

CYANOGEN. *Syn.* PRUSSINE. CYANOGENIUM. BICARBURET OF NITROGEN. (From κυανος, *blue*, and γεννaω, *to generate.*) A compound of carbon and nitrogen, discovered by M. Gay Lussac, in 1815.

Prep. Expose carefully-dried bicyanide of mercury in a small retort, to the heat of a spirit-lamp, and collect the gas in the mercurial pneumatic trough.

Prop. A colorless gas, possessing a pungent and peculiar odor. Under a pressure of 3 or 4 atmospheres, it becomes liquid at a temperature of 45°, (Faraday,) and this fluid again becomes gaseous on withdrawal of the pressure. Water absorbs nearly 5 times its bulk of cyanogen at 60°, and alcohol about 23 times. With hydrogen it forms hydrocyanic acid, and with the metals, cyanides, or cyanurets. (See CYANIDE and HYDROCYANIC ACID.)

CYANURIC ACID. *Syn.* PYRO-URIC ACID. A peculiar acid, discovered by Scheele. It is a product of the decomposition of the soluble cyanates by dilute acid, of urea by heat, &c.

Prep. Heat urea until it fuses, and is converted into a white or grayish-white mass; dissolve in strong oil of vitriol, and add nitric acid, drop by drop, to the solution until it becomes colorless; then mix the liquid with an equal volume of water. On cooling, crystals of cyanuric acid will be deposited, which must be washed with a little cold water, and then dissolved in 24 parts of boiling water, when crystals of the hydrated acid will form as the solution cools. By exposure to the atmosphere, or a gentle heat, they lose their water and fall into powder.

Prop., &c. It forms salts with the bases called cyanurates. The alkaline cyanurates may be formed by neutralizing a boiling solution of the acid with the base, and the cyanurate of silver by adding a solution of nitrate of silver to another of cyanurate of potassa.

DAHLINE. A substance analogous to starch and inulin, discovered by M. Payen in the bulbs or tubers of the dahlia.

Prep. Diffuse the pulp of dahlia bulbs in its own weight of water, filter through cloth, add $\frac{1}{20}$ part of common chalk, boil for half an hour, and filter. Then press the residuum of the bulbs, mix the liquors, evaporate to $\frac{1}{4}$ths, add 4$\frac{2}{3}$ of animal charcoal, clarify with the white of an egg, filter, and evaporate until a film forms upon the surface; as the liquid cools, dahline will be deposited.

Remarks. The bulbs of dahlias yield about 4$\frac{2}{3}$ of dahline. It differs from starch and inulin by forming a granulated mass, when its aqueous solution is evaporated; as also in its specific gravity, which is 1·356, whereas that of starch is 1·53.

DAIRY. An apartment either in a house, or adjoining it, for the purpose of keeping milk, and making butter, cheese, &c.

The best situation for a dairy is on the north side of the dwelling-house, because it will thereby be sheltered from the sun during the heat of the day. Ample means should be provided to ensure thorough ventilation by means of Venetian shutters, or suitable windows, so arranged as to admit the air, but to exclude flies and other insects; and also to permit a due regulation of the temperature, which should be preserved as much as possible in an equable state, ranging from 45° to 55° F. To lessen the influence of external variations of temperature, the walls should be double, or of considerable thickness, and the windows provided with shutters or doors. In summer the heat may be lessened by sprinkling water upon the floor, which will produce a considerable degree of cold by its evaporation. Dairies built of mud or "cob," are preferred in the west of England, and this preference arises from the uniform temperature they maintain, on account of the great thickness of the walls, and their being very bad conductors of heat. In large dairy-farms, where butter and cheese are made, the dairy is generally a separate building, and divided into 3 or 4 apartments, one of which is called the *milk-room*, a second the *churning-room*, a third the *cheese-room*, containing the cheese-press, &c., and a fourth the *drying-room*, where the cheeses are placed to dry and harden. To these may be added a scullery, furnished with copper, water, &c., for scalding and cleaning the dairy utensils.

Besides the preservation of the milk, after it has been brought into the dairy, and the manufacture, ripening, and preservation of the cheese and butter, the management of a dairy includes an attention to the health and feeding of the cows. These animals require regular and careful treatment. The cow-stall should be visited at an early hour every morning, and the udder of each cow washed clean with cold water and a sponge, after which they should be milked. If any of the cows have sore teats, warm water should be used, and a little dressing of simple ointment, or a lotion of spirit and water applied. When the former is used, great cleanliness is necessary, and the milk should be given to the pigs.

The operation of milking the cows should be performed at regular and early hours, and each cow should be milked as dry as possible, both morning and evening, as, unless this point be attended to, the quantity of milk will decrease. After each cow has been milked as dry as possible, the dairy-maid should begin again with the one first milked, and proceed to "drip" each of them, by which means not only will the "strippings," which are very rich in cream, be obtained, but the health and productiveness of the animals will be promoted. Cleanliness is very essential in all the operations of the dairy, and in none more so than in the milking of the cows. The hands and arms of the milk-maid should be kept scrupulously clean, and should be well washed with soap and water, after touching the udder of a sick cow, as without this precaution, the sores may be conveyed to the healthy ones. The milk-cans should be scalded out daily, and, as well as all the other dairy utensils, should be kept *clean* and *dry*. Before placing the milk on the shelves of the dairy, it should be strained through a hair-sieve or a searce, covered with clean cheesecloth, as by this precaution, any stray hairs that may have fallen into the milk-pail will be taken out.

It is of importance in the management of cows, that the majority of them should calve from Lady-day to May, that the large quantity of milk that follows, may be supported by the luxuriance of vegetation. The other portion should calve in August or September, to ensure a supply during the winter. The calves should be taken from the cows when 7 or 8 days old, and fed with skimmed-milk, made oatmeal, &c., allowing them to be out in the pasture during some portion of every day, unless it should be wet and cold.

The average produce of a milch cow, supplied with good pasturage, is about 3 gallons daily, from Lady-day to Michaelmas, and from that time to February, about 1 gallon daily. Cows of good breed will be profitable milkers to 14 or 15 years of age, if well fed. (See BUTTER, COWS, CREAM, and CHEESE.)

DAMP LINEN is very injurious to health, and should be especially avoided. In travelling, when it is expected that the bed has not been properly aired, the best way is to sleep between the blankets. A good plan to ascertain this point, is to have the bed warmed, and immediately after to introduce a clean, dry glass tumbler between the sheets, in an inverted position; after it has remained a few minutes it should be examined, when if found *dry*, and untarnished with steam, it may be fairly presumed that the bed is perfectly safe; but if the reverse should be the case, it should be avoided. When it is impossible to prevent the use of damp linen, as articles of dress, the best way to obviate any ill effects, is to keep constantly in motion, and avoid remaining near the fire, or in a warm apartment, or a draught of cold air, until sufficient time has elapsed to allow the escape of the moisture.

DAMSONS. A species of small black plum, much used in the preparations of tarts, &c. They are rather apt to disagree with delicate stomachs, and also to affect the bowels.

DAMSON CHEESE. *Prep.* Boil the fruit in a sufficient quantity of water to cover it; strain the pulp through a very coarse sieve; to each lb. add 4 oz. of sugar. Boil till it begins to candy on the sides, then pour it into tin moulds. Other kinds of plums may be treated in the same way, as also cherries, and several other kinds of fruit.

DANDELION. *Syn.* LEONTODON. LEONTODON TARAXACUM. The root of this plant is diuretic and tonic. It is roasted and used as coffee, and when mixed with an equal weight of foreign coffee, constitutes the article once so much puffed under the name of "Dandelion coffee." The blanched leaves are used in salads, and the inspissated juice, extract, and decoction are employed in medicine, and are considered as detergent, aperitive, and deobstruent.

DAPHNIN. A peculiar bitter principle, discovered by Vauquelin in the daphne alpina. It is procured by separating the resin from the alcoholic tincture of the bark by evaporation; afterwards diluting with water, filtering, and adding acetate of lead. A yellow substance, which has been called daphnate of lead, falls down, which, when decomposed by sulphureted hydrogen, forms small transparent crystals of daphnin. This substance is bitter, gray-colored, volatile, and sparingly soluble in cold water.

DATURA. *Syn.* DATURIA. DATURINA. DATURIUM. An organic alkali, discovered by Geiger and Hesse in datura stramonium. It is best obtained from the seeds. It is sparingly soluble in cold water; but more so in hot water, alcohol, and ether. It tastes bitter, dilates the pupil strongly, and is very poisonous. It may be sublimed unaltered, and may be obtained in prismatic crystals, by the addition of water to its alcoholic solution. With the acids it forms salts, which are mostly crystallizable. (See ALKALOID.)

DEAFNESS. *Syn.* DYSECŒA, (from δυς, *with difficulty*, and ακοη, *hearing*,) an imperfect state, or deficiency of the faculty of hearing. Deafness has been divided into two species:—1. *Organic*, arising from wax in the meatus, injuries of the membrane, or inflammation and obstruction of the tube. 2. *Atonic*, when without any discernible injury of the organ. (Cullen.) When deafness is present in infancy and childhood, it is accompanied with dumbness, or imperfect articulation, in consequence of the impossibility of conveying a knowledge of the sounds necessary for the exercise of the imitative faculty of speech. A common cause of deafness is some imperfection or obstruction of the passage leading to the membrane of the tympanum or drum of the ear. In some cases this passage is totally occluded by a membrane, or some malformation of the tube, which may frequently be removed by a surgical operation. Even instances of partial obliteration of this passage have occurred, which have been effectually cured. A more frequent cause of deafness is, however, the presence of foreign bodies in the aural passages, or the accumulation of hardened wax. In these cases the best treatment is to inject warm water into the ear by means of a proper syringe, the head being placed with that side upwards during the operation. Insects may be destroyed by pouring a spoonful of warm olive oil, or camphorated oil, into the ear over night, retaining it there until the next morning by means of a piece of cotton wool, when it may be washed out with a little mild soap and warm water. When there is a deficient secretion of wax, or a dryness of the aural passage, mild oleaginous stimulants should be employed. For this purpose a little olive or almond oil, to which a few drops of oil of turpentine, oil of juniper, or camphor liniment, have been added, may be used with advantage. When deafness is accompanied with continued acute pain, or a discharge of a purulent matter, inflammation of the tympanum, or some other portion of the internal ear, probably exists, and medical advice should be sought as soon as possible. The deafness that frequently accompanies a violent cold, is generally caused by obstructions in the Eustachian tube, and goes off as soon as the secretions return to a healthy state. When imperfect hearing depends upon obtundity of the auditory nerve, or an extensive obliteration or malformation of the internal ear, it scarcely admits of cure.

DEAFNESS, TAYLOR'S REMEDY FOR. *Prep.* Oil of almonds ℔.j; garlic, bruised, ℥ij; alkanet root ℥ss; infuse and strain. A little is poured into the ear in deafness.

DEATH. In cases of sudden death, interment should be deferred till signs of putrefaction begin to appear, especially when no gradation of disease

has preceded, as in cases of apoplexy, hysterics, external injuries, drowning, suffocation, &c.

In cases of malignant fevers, putrescency advances speedily, and, under such circumstances, the time of the funeral ought not to be unnecessarily protracted; but this ought never to be the case in northern climates, and in temperate or even cool weather. Young persons, in the bloom of health and vigor, may be struck down by an illness of only a few days, or even hours, but they ought not to be consigned to the same summary sentence, merely because custom has ordained it. No sooner has breathing apparently ceased, and the visage assumed a ghastly or death-like hue, than the patient, after his eyes are closed, is too often hurried into a coffin, and the body, scarcely yet cold, is precipitated into the grave. So extremely fallacious are the signs of death, that too often has the semblance been mistaken for the reality; especially after sudden accidents, or short illness. Many of these, however, by prompt means and judicious treatment, have been happily restored.

Unequivocal proofs of death should always be waited for, and every possible means of resuscitation persevered in when these do not appear, especially when we consider how appearances may be deceitful, and how unexpectedly the latent sparks of life may be rekindled. The effects of *sound* upon animal life are astonishing. The beat of a drum, for instance, has had a very beneficial effect upon persons in a state of suspended animation. At one time, a scream, extorted by grief, proved the means of resuscitating a person who was supposed to be dead, and who had exhibited the usual recent marks of the extinction of life. In cases of catalepsy, or trance, having the semblance of death, the action of the lungs and heart continues, though in a nearly imperceptible degree. By placing a cold mirror, or piece of highly polished metal, immediately over the mouth of the patient, symptoms of moisture will appear upon the surface, if the most feeble respiration takes place.

DEBILITY. Weakness. Feebleness. When this arises from a diseased action of the stomach, the occasional use of mild aperients, followed by bitters and tonics, is the best treatment. When from a general laxity of the solids, and there are no symptoms of fever, nor a tendency of blood to the head, a course of chalybeates will prove advantageous. Either of the following may be adopted for this purpose. I. Pure sulphate of iron 1 dr.; extract of gentian and powdered ginger, of each 1½ dr., beat together into a mass, and divide into 120 pills, one to be taken morning, noon, and night. II. Sulphate of iron and powdered myrrh, of each 1 dr.; sulphate of quinine ½ dr.; conserve of roses, sufficient to form a pill mass. Divide into 120 pills. *Dose*, as before.

DECANTATION. The operation of pouring or drawing off the clear portion of a liquid, from the impurities or grosser matter, that has subsided. It is commonly performed, either by gently inclining the vessel, or by the use of a syphon or pump. In the laboratory it is much resorted to in the purification of precipitates, or other similar operations, where repeated edulcoration or washing is required, for which purpose it is preferable to filtration, from being less troublesome and more economical. In these cases, after a sufficient time having been allowed for the subsidence of the precipitate or powder, or for the clearing of the supernatant fluid, it is decanted, and its place supplied by a fresh portion of water, which, after sufficient agitation, is similarly treated, and the whole operation repeated as often as necessary.

DECANTERS. There is often much difficulty experienced in cleaning decanters, especially after port wine has stood in them for some time. The best way is to wash them out with a little pearlash and warm water, adding a spoonful or two of fresh slaked lime if necessary. To facilitate the action of the fluid against the sides of the glass, a few small cinders may be used. A spoonful of strong oil of vitriol will also rapidly remove any kind of dirt from glass bottles, but care must be taken not to pour it into them while wet, nor to wash them out until they have been thoroughly drained; for when the above strong acid comes into contact with water, sufficient heat is generated to crack the glass.

Another cause of annoyance which frequently occurs, is, that the stoppers of glass bottles and decanters become fixed in their places so firmly, that the exertion of sufficient force to remove them would endanger the vessels. In such cases, knocking them gently with a piece of wood, first on one side, and then on the other, will generally loosen them. If this method does not succeed, a cloth wetted with hot water, and applied to the neck, will generally expand the glass sufficiently to allow them to be easily withdrawn. Should neither of these methods succeed, the decanter or bottle may be placed in a kettle or boiler of cold water, which must then be heated to the boiling point, by which time the stopper will in most cases be loosened by the pressure of the air confined within the vessel, which will be greatly expanded by the heat. This plan should, however, never be adopted but as a last resource, as if the vessel be not sufficiently strong to resist the internal pressure, it must of course be broken. A piece of cloth should be tied over the stopper, in such a way as to permit it to become well loosened, but to prevent it being blown out, because in the latter case it would most likely be broken on falling to the ground.

DECARBONIZATION. This operation is performed on cast iron, to convert it into steel or soft iron. The articles to be decarbonized are packed in finely-powdered hæmatite, or native oxide of iron, to which iron filings are often added, and exposed for some time to a strong red heat, by which the excess of carbon is abstracted or burnt out. The process somewhat resembles annealing or cementation.

DECOCTION. *Syn.* Decoction, (*Fr.*) Abkochung, (*Ger.*) Decoctum, (*Lat.*) From *decoquo*, to boil. (In Pharmacy.) An aqueous solution of the active principles of vegetables, obtained by boiling. (In Chemistry.) A continued ebullition with water, to separate such parts of bodies as are only soluble at the boiling temperature.

The effect of boiling water differs greatly from that of infusion. At the heat of 212°, the essential oils and aromatic principles of vegetables are dissipated or decomposed; while by infusion in hot water, in covered vessels, they remain for the

most part uninjured. The solvent powers of *boiling* water are, however, much greater than those of *hot* water; and many vegetable principles scarcely acted on by the latter, are freely soluble in the former. This is the case with many of the alkaloids, on which the medicinal virtues of several vegetables depend. On the other hand, it must be recollected that the solutions of many substances, though more readily made by boiling, are speedily weakened or rendered inert by ebullition, in consequence of the active principles being either volatilized along with the steam, or oxidized, or decomposed by exposure to the atmosphere. This is particularly the case with substances abounding in extractive or astringent matter. When the medicinal properties of vegetables are volatile, or are injured by a *strong* heat, infusion should be had recourse to, in preference to boiling; but when a solution of the fixed constituents is alone sought, decoction is preferable. In preparing compound decoctions, those ingredients should be boiled first which least readily impart their active principles, and those which most readily impart them should be added afterwards. In many cases it will be proper simply to infuse the more aromatic substances in the hot decoction of the other ingredients, by which means their volatile principles will be preserved. Some of the preparations in the pharmacopœias are injudiciously ordered to be boiled, while others that would not suffer by ebullition along with water, are directed to be infused. As examples of the former, may be mentioned the compound decoctions of aloes, chamomile, and sarsaparilla, and the simple decoctions of mezereon, cinchona bark, &c.; as examples of the latter, the infusions of quassia and rhatany may be noticed.

For making decoctions, the substances should be well bruised, or reduced to a *very coarse* powder, or, if fresh and soft, they should be sliced small. In the former case, any *very fine* powder or *adhering dust* should be removed with a sieve, as its presence would tend to make the product thick and disagreeable, and also more troublesome to strain. The vessel in which the ebullition is conducted should be furnished with an accurately fitting cover, the better to exclude the air; and the application of the heat should be so conducted that the fluid may be kept "*simmering*," or only *gently boiling*, as *violent* boiling is not only quite *unnecessary*, but absolutely *injurious*. In every case the liquor should be strained while *hot*, but *not* boiling, and the best method of doing this is to employ a fine hair sieve, or a coarse flannel bag. In general it is found, that as decoctions cool, a sediment is formed, in consequence of the boiling water dissolving a larger portion of vegetable matter than it can retain in solution when cold. This deposite for the most part consists of the active principles of the solution, and should be mingled with the clear liquid by agitation, when the decoction enters into extemporaneous compositions, or when the dose is taken. It will thus be seen that the common practice of leaving the filtration until the liquid has become cold, and also of rejecting the sediment, is injudicious, and should be scrupulously avoided; as, however, much decoctions so prepared may please the eye, they are not only *inferior in strength*, but, in many cases, *nearly inert*. It may be further remarked, that LONG boiling is in no case necessary, and should be avoided, especially in decoctions prepared from aromatic vegetables, or those abounding in extractive. The colleges, in such cases, direct the ingredients "to be boiled for a *short time*," (P. D Art. Dec. Chamomeli Co.;) or "for 10 minutes," (P. L. Art. Dec. Cinchonæ;) or they limit the period of the ebullition by stating the quantity that must be volatilized, as—"boil to a *pint*, and strain," (P. L. Art. Dec. Cetrariæ;) the latter method being generally employed for those substances that do not suffer by lengthened boiling.

Distilled water, or perfectly clean *rain* water, should alone be used for decoctions. Spring and river water, from containing lime, have less solvent powers.

The aqueous solutions of organic matter, from the nature of their constituents, rapidly ferment, or putrefy. Vegetable substances, from abounding in sugar and starch, mostly undergo the former change, and this takes place, under common circumstances, after the lapse of only a few hours. At the ordinary temperature of the atmosphere, neither decoctions nor infusions are fit to be used in dispensing, unless made the *same day;* they should, consequently, be only prepared in *small quantities* at a time, and any unconsumed portion should be rejected. Some of these preparations will keep for 48 hours, in temperate weather, but as the ingredients are mostly of little value, and the menstruum (water) *valueless*, it would be imprudent for the dispenser to risk his own reputation, and the welfare of the patient, by employing an article of dubious quality.

It has of late years become a general practice for the wholesale houses to vend preparations under the name of "CONCENTRATED DECOCTIONS," which, with the exception of the compound decoction of aloes, are stated to be of 8 times the pharmacopœial strength; so that *one drachm* of these liquids, added to *seven* drachms of water, form extemporaneous decoctions, professedly resembling those of the pharmacopœia. The decoction of aloes is made of only *four* times the usual strength, as the nature of its composition would not permit further concentration. I feel it to be, however, a bounden duty to the sick, to state, that such preparations are but very imperfect substitutes for the decoctions of the Colleges, and in the usual manner. The extreme difficulty of forming concentrated solutions of vegetable matter with bulky ingredients, too often leads to the omission of a portion of the materials, or to the practice of concentrating the liquid by evaporation; in the first case, the strength is of course less than it should be, and in the second, the quality is injured, and perhaps the preparation is rendered nearly inert by the lengthened exposure to heat, and the consequent volatilization or decomposition of its active constituents. The common practice of adding a considerable portion of spirit to these preparations, which is absolutely necessary to make them keep, is also objectionable, as, in many cases in which decoctions are prescribed, this article, even in small quantities, would have a prejudicial effect. Besides, the object in employing aqueous decoctions or infusions is to avoid the use of spirituous preparations. Some concentrated decoctions have been

recently offered for sale which do not contain a particle of alcohol, being preserved by the addition of sulphurous acid, or the sulphite of lime; but on lately examining a sample of one of these, I found it perfectly worthless; it possessed a strong odor of bark, but it contained barely a trace of cinchonine. (See CONCENTRATION, INFUSION, ESSENCE, EXTRACTS, LIQUOR.)

DECOCTION, COOLING. *Prep.* Barley water 1 pint; muriatic acid 1 drachm; sirup or lump sugar to sweeten. *Use.* A common drink in putrid fevers, taken ad libitum.

DECOCTION, DIAPHORETIC *Prep.* Decoction of bark 1 pint; liquor of acetate of ammonia 4 oz.; aromatic confection 1 oz. *Dose.* 2 or 3 tablespoonfuls every 3 hours.

DECOCTION FOR FOMENTATION. *Syn.* DECOCTUM PRO FOMENTO, (P. L. 1788.) *Prep.* Leaves of southernwood, sea wormwood, and chamomile flowers, of each 1 oz.; laurel leaves ½ oz.; water 5 pints; boil, and strain.

DECOCTION, MERCURIAL. *Prep.* Corrosive sublimate gr. j; (dissolved in) spirits of wine 30 drops; extract of sarsaparilla ʒiij; decoction of sarsaparilla f℥viij; mix. *Dose.* One large tablespoonful 3 times a day.

DECOCTION OF ALOES. (COMPOUND.) *Syn.* DECOCTUM ALOES COMPOSITUM, (P. L. & E.) BALSAM OF LIFE. BAUME DE VIE. *Prep.* I. Extract of liquorice ʒvij; carbonate of potassa ʒj; aloes, myrrh, and saffron, of each ʒiss; compound tincture of cardamoms f℥vij; water 1½ pints. Boil the first five ingredients in the water, until the fluid be reduced to a pint, strain, cool, and add the tincture. (P. L.)

Remarks. The preceding instructions, which are those of our Pharmacopœia, appear to be objectionable, as there cannot possibly be any advantage in boiling the saffron, while by such an operation the whole of its fragrance is dissipated. A better plan is to macerate the saffron in the tincture for a few days, previously to adding the latter to the decoction of the other ingredients. After the tincture has been strained off from the saffron, the latter may be washed with a little water, to remove any adhering color and odor, and this may be added to the decoction. The addition of the tincture produces a deposite of mucilaginous and feculent matter, which has been dissolved out of the liquorice, for which reason some houses omit the latter altogether, and supply its place with an equal quantity of lump sugar, and a little coloring. By this method the liquid, after being once rendered fine by decanting or filtering, will continue so for any length of time. The full quantity of saffron ordered by the College, is seldom used in making this preparation, a small fraction of it only being employed. The following formula is used by a wholesale London drug house, that does very largely in this article.

II. Solazzi juice 1½ lb.; kali (carbonate of potassa) 3 oz.; aloes (hepatic) 4½ oz.; myrrh (small) 4 oz.; water 4½ gallons; boil to 3 gallons, strain through flannel, cool, and add 10 pints of compound tincture of cardamoms, that has been digested for 10 days on saffron, 1½ oz; mix well, and add essential oil of nutmeg 15 drops, oils of cassia and caraway, of each 10 drops, and oils of cloves and pimento, of each 5 drops. Agitate well together, and allow it to repose for a week, then decant the clear portion from the sediment, and preserve it in a cool place.

DECOCTION OF ALOES, (CONCENTRATED COMPOUND.) In preparing this article, there is considerable advantage in substituting sugar for the liquorice, as, if the latter be used, there is a large deposite from which the last portion of the liquid is separated with difficulty. The following form may be used with advantage.

I. Lump sugar 8 oz.; burnt sugar coloring ½ pint; carbonate of potash 2 oz.; aloes, myrrh, and saffron, of each 3 oz.; compound tincture of cardamoms ½ a gallon; water 3 pints; boil the first five in the water, until the liquid be *nearly* reduced to one half; cool and add the tincture, previously digested for a week, on the saffron; then proceed as directed in the last article.

Remarks. The proportion of saffron *usually* employed in the drug trade for the above quantity, is ½ oz.; and some fragrant oils are frequently added to bring up the smell, as before described. The high price of saffron, for some time past, has led many unprincipled persons to omit it altogether. Should it be preferred to use extract of liquorice, 14 oz. of solazzi juice must be added to the above, and the sugar and coloring omitted. The price at which many houses offer this preparation, is absolutely less than the bare cost of the ingredients ordered by the College. I am in the habit of preparing this article by digesting the aloes, myrrh, liquorice, and potassa, all reduced to powder, along with the saffron, in the tincture, for a fortnight, employing frequent agitation. In this case the proportion of the tincture in the above formula should be 5¾ pints, and the water should be omitted. In this way a very odorous and beautiful preparation is produced, which has been much admired.

DECOCTION OF APOCYNUM. *Syn.* DECOCTUM APOCYNI. *Prep.* (*Dr. Griscom.*) Root of apocynum cannabinum and juniper berries, of each ℥j; water 3 pints; boil to 1 quart and strain.

DECOCTION OF ASPARAGUS. *Syn.* DEC. ASPARAGI. *Prep.* asparagus root ℥j; water lb. ij; boil for 5 minutes and strain.

DECOCTION OF AVENS. *Syn.* DEC. GEI URBANI. *Prep.* (Thompson.) Avens root (herb bennet) ℥j; water 1 pint; boil for 15 minutes.

DECOCTION OF BALLOTA LANATA. *Prep.* Leaves and flowers 2 oz.; water 2 lbs.; boil to 1 lb. and strain. *Dose.* 1 or 2 oz., 3 or 4 times a day; as a diuretic in dropsy.

DECOCTION OF BARK. *Syn.* DEC. OF CINCHONA. I. (*Dec. of Lanced-leaved Cinchona or Pale Bark. Decoctum Cinchonæ*, P. L. 1788, 1809, and 1824. *Dec. Cinchonæ Lancifoliæ*, P. L. 1836.) *Prep.* Lance-leaved cinchona bark, well bruised, ℥j; water, sufficient to leave 1 pint when strained; boil for 10 minutes, (P. L.) Before dispensing or pouring out the dose, the sediment should be shaken up with the liquid, as it consists of the most active portion of the bark.

II. (*Decoction of Heart-leaved Cinchona or Yellow Bark. Syn. Dec. Cinchonæ Cordifoliæ*, P. L.) *Prep.* Heart-leaved cinchona, or yellow bark, bruised, ʒx; distilled water 1 pint; boil for 10 minutes, and strain while hot.

III. (*Decoction of Oblong-leaved Cinchona or

Red Bark. *Syn.* *Dec. Cinchonæ Oblongifoliæ,* P. L.) As the decoction of yellow bark.

Dose, &c. Either of the above is given in doses of 1 to 2 oz., 3 or 4 times daily, as a tonic, stomachic, and febrifuge, where the stomach will not bear the administration of bark in powder, in cases of dyspepsia, convalescences, &c.

DECOCTION OF BARLEY. *Syn.* BARLEY WATER. PLAIN DITTO. AQUA HORDEATA. DEC. HORDEI, (P. L.) *Prep.* Pearl barley ℥iiss; water 4½ pints. First wash the barley with some water, then boil in ½ pint of the water for a LITTLE time, throw this away, pour on the remaining 4 pints, boiling hot, boil down to 1 quart, and strain.

DECOCTION OF BARLEY, COMPOUND. *Syn.* BARLEY WATER. PECTORAL DECOCTION. PTISANA COMMUNIS. DEC. HORDEI COMPOSITUM, (P L.) *Prep.* Barley water 1 quart; sliced figs and stoned raisins, of each ℥iiss; liquorice root, sliced and bruised, ʒv; water 1 pint; boil down to 1 quart, and strain.

Remarks. Both the above are used as demulcents in fevers, phthisis, strangury, &c., taken ad libitum. They are slightly laxative, and where this would be an objection to their use, a few drops of laudanum may be added. Mixed with an equal quantity of decoction of bark, barley water forms an excellent gargle in cynanche maligna, (ulcerated sore throat,) and, with a like quantity of milk and a little sugar, a good substitute for the breast in dry-nursing infants.

DECOCTION OF THE BLUE CARDINAL FLOWER. *Syn.* DEC. LOBELIÆ SYPHILITICÆ. DEC. LOBELIÆ. *Prep.* (P. C.) Root of the lobelia syphilitica 1 handful; water 12 lbs.; boil to 7 lbs., and strain.

Remarks. This decoction is purgative, and was once thought to possess alterative virtues. It was strongly recommended by Swediaur, in certain complaints; he gave half a pint at first twice daily, and afterwards 4 times a day, unless it acted too strongly on the bowels, when the frequency of the dose was diminished, or it was discontinued for 3 or 4 days, and then had recourse to again, until the cure was effected. It is now seldom employed.

DECOCTION OF BROOM TOPS. *Syn.* DEC. SPARTII CACUMNIUM. DEC. SCOPARII. *Prep.* Tops of broom (cut small) 1 oz.; water 1 pint; boil to one half, and strain. As a diuretic in dropsy.

DECOCTION OF BROOM, COMPOUND. *Syn.* DEC. SPARTII CACUMNIUM CO. DEC. SCOPARII COMPOSITUM, (P. L.) *Prep.* Broom tops, juniper berries, and dandelion root, of each ℥ss; water 1½ pint; boil to 1 pint, and strain.

Remarks. The Edinburgh preparation, in addition to the above, contains 2½ drs. of cream of tartar, and is hence said to be preferable to that of the London Pharmacopœia. Both the above are diuretic, and are chiefly administered in dropsy, especially ascites, (dropsy of the belly.)

DECOCTION OF BURDOCK. *Syn.* DEC. BARDANÆ. *Prep.* (P. C.) Bardana root ℥vj; water 5 pints; boil to 3 pints, and strain.

Use. As an alterative, a pint to a quart daily, or ad libitum, in all those cases in which sarsaparilla is recommended.

DECOCTION OF BURNT SPONGE. *Syn.* DEC. SPONGIÆ. DEC. SPONGIÆ USTÆ. *Prep.* (Hufeland.) Burnt sponge (powdered) ℥j; water 1 pint; boil a *little*, digest 12 hours, strain, and add of cinnamon water ℥ij.

Remarks. Burnt sponge was once much recommended in scrofula, but has fallen into disuse. If it possesses any virtue, it must depend upon the *very small* quantity of iodine it generally contains.

DECOCTION OF CABBAGE TREE BARK. *Syn.* DEC. GEOFFROYÆ, (P. D.) Bark of the cabbage tree bruised ℥j; water 1 quart; boil to one half, strain, and add ℥ij of sirup of orange peel.

Uses, &c. Cathartic, narcotic, and anthelmintic. *Dose.* 2 to 4 tablespoonfuls for an adult.

DECOCTION OF CALUMBA. *Syn.* DEC. CALUMBÆ. *Prep.* Calumba root, sliced, ℥j; water 1½ pint; boil to 1 pint and strain. *Dose.* A tablespoonful 2 or 3 times daily. Bitter, tonic stomachic.

DECOCTION OF CALUMBA, COMPOUND. *Syn.* DEC. CALUMBÆ COMP. (P. U. S.) *Prep.* Calumba root and quassia sliced, of each ʒij; orange peel ʒj; rhubarb ℈j; carbonate of potassa ʒss; water 1 pint. Boil to f℥xvj; strain, and add compound tincture of lavender, f℥ss. *Dose, &c.*, as above.

DECOCTION OF CEYLON MOSS. *Syn.* DEC. FUCI AMYLACEI. *Prep.* Ceylon moss 1 oz.; water 3 pints; boil for 20 minutes.

DECOCTION OF CHAMOMILE. *Syn.* DEC. ANTHEMIDIS. DEC. CHAMÆMELI. *Prep.* Chamomile flowers ℥j; water 1 pint; gently simmer for 5 minutes in a closely covered vessel.

DECOCTION OF CHAMOMILE, COMPOUND. *Syn.* DEC. CHAMÆMELI COMPOSITUM, (P. D.) *Prep.* Chamomile flowers dried ℥ss; fennel seeds ʒij; water 1 pint; as above.

Uses, &c. Both the above are bitter, stomachic, and tonic, and are commonly used as fomentations and clysters.

DECOCTION OF CHYRATA. *Syn.* DEC. CHYRATÆ. *Prep.* Chyrata ℥j; water 1 quart; boil for 10 minutes, and strain.

DECOCTION OF CINCHONA AND SNAKEROOT. *Syn.* DECOCTION CINCHONÆ CUM SERPENTARIA. *Prep.* (Sir J. Pringle.) Cinchona bark ʒiij; water 1 pint; boil to one half, and infuse therein Virginian snakeroot ʒiij.

DECOCTION OF COLTSFOOT. *Syn* DEC. TUSSILAGINIS. *Prep.* (Pereira.) Fresh leaves of coltsfoot ℥ij; water 1 quart; boil to a pint.

Remarks. This decoction is a popular remedy in chronic coughs, consumption, &c. It is emollient and demulcent. *Dose.* ½ a teacupful, ad libitum.

DECOCTION OF CORSICAN MOSS. *Syn.* DEC. HELMINTHOCORTI. *Prep.* Corsican moss ʒv; water 1½ pint; boil to a pint.

DECOCTION OF DANDELION. *Syn.* DEC. TARAXACI, (P. D.) *Prep.* Fresh herb and root ℥iv; (℥vii P. E.;) water lb. ij; (2 pints P. E.;) boil to one half, and strain.

Remarks. This decoction is aperient, tonic, and stomachic. The dose is 2 to 3 oz. 2 or 3 times daily. Its virtue is increased by combination with saline medicines, as bitartrate of potassa, &c. The root has considerably the most virtue when dug up in autumn, as it is then full of milky juice

DECOCTION OF DEADLY NIGHT-

lb.; orange-flower water 1 dr.; and essence of lemon 2 or 3 drops; mix well.

JELLY, ARROW ROOT. *Syn.* MADE ARROW ROOT. GELATINA MARANTÆ. *Prep.* Arrow root 1 oz.; rub to a smooth paste with a spoonful or two of cold water, then gradually add of boiling water half a pint, stirring all the while. It may be thinned with more water, if required, and flavored with milk, wine, sugar, and spices, according to the palate of the consumer. TOUS LES MOIS JELLY is made in the same way.

JELLY, BISCUIT. *Prep.* White biscuit, crushed beneath the rolling-pin, 4 oz.; cold water 2 quarts; soak for some hours, boil to one half, strain, evaporate to 1 pint, add white sugar 1 lb.; red wine 4 oz., and cinnamon 1 oz. Given in weakness of the stomach, and in dysentery and diarrhœa.

JELLY, BREAD. *Syn.* PANADA. GELATINA PANIS. *Prep.* Cut a French roll into slices, toast them on each side, and boil in one quart of water, until the whole forms a jelly, adding more water if required; strain, and flavor as above. Very nutritious. It may be made with broth from which the fat has been skimmed, instead of water.

JELLY, BROTH. *Syn.* SOUP JELLY. Broth, or soup from which the fat has been skimmed, evaporated until it becomes gelatinous on cooling. See SOUP, PORTABLE.

JELLY, CALVES' FEET. (See p. 156.)

JELLY, CEYLON MOSS. *Syn.* GELATINA FUCI AMYLACEI. *Prep.* (Dr. Sigmond.) Boil Ceylon moss ℥ss in water one quart, for 25 minutes, or till the liquid jellies on cooling; strain and flavor.

JELLY, CORSICAN MOSS. *Syn.* GELATINA HELMINTHOCORTI. *Prep.* (P. Cod.) Corsican wormweed or moss ℥j; water q. s. to yield ℥viij; boil for one hour; strain, add isinglass previously soaked in a little water, ʒj; refined sugar ℥ij; white wine f℥ij. Vermifuge.

JELLY, GRAVY. By evaporating meat gravies.

JELLY, HARTSHORN. *Syn.* GELATINA CORNU CERVI. *Prep.* (P. Cod.) Hartshorn shavings ℥viij; wash in water, then boil in clean water 3 pints, till reduced to one half; strain, press, add sugar ℥iv, the juice of one lemon, and the white of an egg beat up with a little cold water; mix well, clarify by heat, evaporate till it jellies on cooling, then add the peel of the lemon, and set in a cool place. It may be flavored with wine, and any of the spices. Very nutritious.

JELLY, ICELAND MOSS. *Syn.* GELATINA LICHENIS. *Prep.* (P. Cod.) Iceland moss ℥ij; soak for 1 or 2 days in cold water, then boil for one hour in water q. s. to yield a strong solution; strain, decant the clear after repose, apply heat, dissolve therein isinglass ʒj, evaporate to a proper consistence, put it into pots, and set them in a cool place. Nutritious. Recommended in phthisis. The jelly of Iceland moss and cinchona (Gelatina lichenis cum cinchona, P. Cod.) is made by adding ℥vj of sirup of cinchona to the above.

JELLY, IRISH MOSS. *Syn.* GELATINA CHONDRI. *Prep.* Soak Irish moss (carrageen) in cold water, then boil in water one quart to a proper consistence; strain, and flavor. Nutritious.

JELLY, ISINGLASS. *Syn.* CONFECTIONER'S JELLY. GELATINA ICTHYOCOLLÆ. *Prep.* Isinglass dissolved in water by boiling, and evaporated till it jellies on cooling. To render it quite transparent, it should be clarified with white of egg. (See CALVES' FEET JELLY.) Milk, wine, and spices may be added, according to taste. 1½ oz. of good isinglass makes a pint of very strong jelly. (See BLANCMANGE.)

JELLY, RESTORATIVE. (Dr. Radcliffe.) *Prep.* Boil a leg of pork in water 3 gallons, till reduced to 1 gallon, pour off the liquid, when cold remove the fat, add ½ oz. each of mace and nutmegs, again boil, and strain.

JELLY, RICE. *Syn.* CREME DE RIZ. Rice 3 spoonfuls; boil in water, add 10 sweet and 5 bitter almonds, and enough sugar; make an emulsion, and flavor with cinnamon or orange-flower water.

JELLY, SAGO. Soak sago in cold water one hour, strain, and boil in fresh water till it becomes transparent; then add wine, sugar, clear broth, milk, or spices, to flavor. 1 oz. of sago makes a pint of jelly.

JELLY, TAPIOCA. As the last. It may be flavored with lemon juice and peel, wine, or spices at pleasure. 1 oz. of tapioca makes a pint of jelly.

JELLIES, FRUIT. These are all prepared by boiling the strained juice of the fruit mixed with about half its weight of refined sugar, until it jellies on cooling, observing to carefully remove the scum as it rises. The process should be conducted by a gentle heat, and it is preferable not to add the sugar until the juice is somewhat concentrated, as by *lengthened* boiling the quality of the sugar is injured.

Jellies are placed in pots or glasses, like jams The following are the principal *fruit jellies*:—

Apple jelly. Strained apple juice 1 quart; sugar 1 lb.; boil to a jelly. When apple juice cannot be obtained, the fruit may be boiled with sufficient water to cover it, and the liquor pressed out and used as juice.

Barberry jelly. (Gelatina berberorum, P. E. 1744. Rob de berberis.) Barberries and refined sugar equal parts; as last. One pint of the strained juice to sugar 6 or 8 oz. makes a better jelly.

Cherry jelly. 1. Cornelian cherry jelly, (*Rob de cornis.*) Cornelian cherries 1 lb.; water ¼ pint; bruise, boil, strain; add sugar 6 oz., and boil till the liquid jellies.—2. Kentish cherry jelly, (*Rob de cerasis.*) Strained juice 1 pint; refined sugar 6 oz.; boil down as before.

Currant jelly, (Rob de ribes.) 1. Juice of any variety of currants 1 pint; white sugar 6 to 8 oz.; as before. Black currant juice requires the most sugar; some add twice the above quantity of sugar to either sort.—2. Strained juice and powdered refined sugar equal parts; mix, stir for 3 or 4 hours, and put it into glasses; in about 3 days it will concrete into a jelly. Other fruit juice may be treated in the same way, especially gooseberry juice.

Elderberry jelly, (Rob of elderberries with sugar. Rob baccarum sambuci cum saccharo.) 1. Juice of elderberries 4 lbs.; sugar 1 to 2 lbs.—2. Juice 1 gallon; sugar 5½ lbs.; produces about one half the weight of jelly.

Gooseberry jelly. Dissolve sugar in one third of its weight of water, by boiling; it will be nearly solid when cold; add an equal weight of goose-

half, adding the cinnamon towards the close of the operation, and strain.

Use. Astringent and tonic. *Dose.* 1 to 4 or 5 tablespoonfuls, in diarrhœa.

DECOCTION OF MALLOWS, COMPOUND. *Syn.* Common Decoction. Dec. pro Enemate, (P. L. 1787.) Dec. commune. Dec. Malvæ compositum, (P. L. 1836.) *Prep.* Mallows, dried, ℥j; chamomile flowers, dried, ℥ss; water 1 pint; boil for 15 minutes, and strain.

Use. For fomentations and enemas.

DECOCTION OF MALT. *Syn.* Sweetwort. Dec. Malti. *Prep.* (Fr. H.) Barley malt 4 oz.; water 3 pints; boil for 10 minutes, add liquorice root ʒj; boil down to a quart, and strain. Demulcent; laxative.

DECOCTION OF MARSHMALLOWS. *Syn.* Dec. Althææ, (P. D.) *Prep.* Dried root and herb of marshmallow ℥iv; raisins, stoned, ℥ij; water 7 pints, (wine measure;) boil down to 5 pints, strain, allow it to deposite the sediment, and decant the clear liquid.

Use, &c. It is demulcent. *Dose.* A cupful ad libitum, in coughs, colds, calculous affections, and other diseases of the urinary organs.

DECOCTION OF MEZEREON. *Syn.* Dec. Mezerei, (P. D. and E.) *Prep.* Mezereon root, in chips, ʒij; liquorice root, bruised, ℥ss; water 1 quart, (3 old wine pints, P. D.;) gently boil to 1½ pint, (2 old wine pints, P. D.,) and strain.

Dose. f℥iij to a teacupful, two or three times a day, in chronic rheumatism, scrofula, lepra, and some other cutaneous affections. Much boiling injures the virtues of mezereon.

DECOCTION OF OAK BARK. *Syn.* Dec. Quercûs. *Prep.* Oak bark ʒx; water 1 quart; boil to one-half, and strain.

Uses, &c. Astringent. It is used as a gargle in ulcerated sore throat, relaxation of the uvula, &c., and as a wash and injection in piles, leucorrhœa, hemorrhages, prolapsus ani, &c.

DECOCTION OF PAREIRA BRAVA. *Syn.* Dec. Pareiræ. *Prep.* (Brodie.) Pareira root ʒv; water 3 pints; boil to one-third.

DECOCTION OF POMEGRANATE. *Syn.* Dec. Granati. *Prep.* I. (P. L.) Pomegranate peel ℥ij; water 1½ pint; boil to a pint, and strain.

II. (P. Cod.) Bark of the pomegranate root ℥ij; water 1½ pint; boil gently to f℥xvj.

III. (Collier.) Bark of the root ℥ij; water 1 pint; boil to one-half. This is the common form used in India.

Remarks. These decoctions are astringent, purgative, and vermifuge. Those prepared from the root, possess the latter property in the highest degree. Dr. Collier recommends the whole of the last preparation to be given at 2 doses, at the interval of 2 hours. It purges, and in 5 or 6 hours frequently expels the worm; if this does not take place, it should be persevered in. "Look for the head of the tænia, (worm;) for if that is not expelled, you have done nothing." (Collier.)

DECOCTION OF PYROLA. *Syn.* Dec. of Winter-Green. Dec. Pyrolæ. Dec. Chimaphilæ, (P. L.) *Prep.* Winter-green ℥j; distilled water 1½ pint; boil to a pint, and strain. *Dose.* 1 to 2 oz. in dropsy, either alone or combined with cream of tartar.

DECOCTION OF POPPIES *Syn.* Dec. Papaveris, (P. L.) *Prep.* Poppy heads, sliced, ℥iv; water 2 quarts; boil 15 minutes, and strain.

Use, &c. This decoction is employed as an emollient fomentation in painful swellings, excoriations, &c. The addition of a ½ pint of vinegar to the above quantity, is said to promote its efficacy

DECOCTION OF PURPLE WILLOW HERB. *Syn.* Dec. Salicariæ. *Prep.* (Thomson.) Fresh root of the purple willow herb ʒx; water 1 pint; boil for 15 minutes.

DECOCTION OF QUINCE SEEDS. *Syn.* Dec. Cydoniæ, (P. L.) *Prep.* Quince seeds ʒij; water 1 pint; simmer them together for 10 minutes, then strain. Demulcent.

DECOCTION OF RICE. *Syn.* Rice Water Rice Drink. Dec. Oryzæ. *Prep.* Rice 2 oz.; water 1 quart; boil to one-half, and strain. Demulcent. A good drink in fevers, coughs, &c. It may be sweetened, and flavored with a little lemon-peel.

DECOCTION OF SARSAPARILLA. *Syn.* Dec. Sarzæ, (P. L. and E.) Dec. Sarsaparillæ, (P. D.) Decoction de Salsepareille, (*Fr.*) Sarsaparille-Dekokte, (*Ger.*) Decotto di Sarsaparillo, (*Ital.*) *Prep.* Sarsaparilla root, sliced, ℥v; boiling distilled water 4 pints; macerate for 4 hours, in a vessel lightly covered, and placed in a warm situation; then take out the root, bruise it, return it again to the liquor, and again macerate for 2 hours; next boil down to 1 quart, and strain. (P. L.) The formulæ of the Irish and Scotch Colleges are similar.

Remarks. The medicinal virtues of sarsaparilla root reside wholly in the bark, or cortical portion; it is therefore quite unnecessary to bruise it, as directed by the Colleges. By those houses which do largely in decoction of sarsaparilla, the root is seldom split or cut; but the bundles in which it is made up are simply untied and spread open, to allow of the free exposure of every part to the solvent action of the water. By this plan, the whole of the soluble portion of the bark is extracted, while the feculent matter that pervades the wood is only partially dissolved out. *Dose.* 4 oz. to half a pint, 3 or 4 times daily. (See Sarsaparilla.)

An *extemporaneous* decoction of sarsaparilla is made by dissolving ¼ oz. of the simple extract in 1 pint of hot water.

DECOCTION OF SARSAPARILLA, (CONCENTRATED.) *Prep.* Sarsaparilla root (Jamaica) 10 lbs.; place it in a large and well-cleaned copper boiler, and add enough water to cover it; bring it to the boiling temperature, then let it macerate, *without boiling*, for 5 or 6 hours, after which boil it for 1 hour, draw off the liquor into *another clean copper pan*, and wash the root (after it has well drained) with boiling water, until the latter runs off but little colored; add the washings to the decoction, and evaporate as quickly as possible to 6½ pints; let it cool, and further add 1½ pint of rectified spirits of wine; mix, and keep it in a well-corked bottle. In a few days it will become as clear and brilliant as brandy, will have but very little sediment, and will keep for any length of time uninjured. Some manufacturers, instead of washing the roots, give it a second and third water, boiling it each time, and evaporating the mixed liquors.

Remarks. 1 drachm of this decoction, mixed with 7 drachms of water, forms a similar preparation to the Decoctum Sarzæ of the Pharmacopœia, and is now very frequently substituted for it in dispensing. (See SARSAPARILLA.)

DECOCTION OF SARSAPARILLA, COMPOUND. *Syn.* LISBON DIET DRINK. COMPOUND DECOCTION OF SARSAPARILLA AND THE WOODS. DECOCTUM LUSITANICUM. DEC. SARSAPARILLÆ COMPOSITUM, (P. D.) DEC. SARZÆ COMP., (P. L.) *Prep.* Decoction of sarsaparilla (boiling) 4 pints; sassafras chips, guaiacum, (rasped,) liquorice root, (bruised,) of each ʒx; mezereon root ʒiij; boil for 15 minutes, and strain.

Dose, &c. 4 to 6 oz. 3 or 4 times a day, either along with or after a mercurial course, in chronic rheumatism, lepra, psoriasis, and several other skin diseases. It is alterative and diaphoretic; during its use the skin should be kept warm. See the preceding articles, and SARSAPARILLA, in its alphabetical order.

DECOCTION OF SARSAPARILLA, COMPOUND, (CONCENTRATED.) There is a very considerable trade done in this article, in consequence of the compound decoction of sarsaparilla being very commonly ordered in prescriptions, and taken in large doses. When mixed with 7 times its weight of water, it forms a similar preparation to the *Decoctum Sarzæ compositum*, P. L.; and is very generally substituted for it in dispensing. When *honestly* and *skilfully* prepared, it is really a most *convenient* and *valuable* article; it is, however, more *frequently* met with of an inferior quality, and as the difference is not readily distinguished by mere ocular examination, it would be better for the dispenser to avoid employing it, unless it be ordered. The following formula is that employed by one of the largest metropolitan drug-houses, which is proverbial for the superior quality of their decoction of sarsaparilla.

Prep. Red Jamaica sarsaparilla 96 lbs.; mezereon root 9 lbs.; liquorice root (bruised) 16 lbs. *Proc.* These are packed into a clean copper pan, and two or three boards with as many ½ cwt. iron weights placed thereon; water is now run in, to about 10 inches higher than the ingredients, and heat is applied until ebullition commences. The materials are now allowed to macerate without boiling for about 6 hours, when the weights and boards are removed, and the liquid is gently boiled for 1 hour, care being taken to add fresh water from time to time, so as to keep the whole well covered. The decoction is next run off, and set evaporating as quickly as possible; the ingredients are then washed with boiling water, by allowing it to descend from a species of shower-bath, after the manner of "sparging," described under "*Scotch ale.*" This is repeated until the water runs off nearly colorless. The whole of the liquid is now evaporated without delay, until reduced to 6¼ gallons, when, after cooling, 2 drachms of essential oil of sassafras, dissolved in 2 gallons of rectified spirit of wine, are added, and afterwards, 1 pint of essence of guaiacum. The liquid is then placed in a suitable sized barrel, set upon its head, fitted with a small cock, (*not* placed *too* near the bottom,) and allowed to repose for a week, by which time it becomes clear and brilliant.

Remarks. To conduct this process successfully, several large copper pans are required; one of which, to boil the ingredients in, must be capable of containing from 120 to 150 gallons at least, and the remainder sufficiently large to receive the liquors drawn off. The evaporation and decoction should also be conducted by steam-heat. A very excellent plan adopted by some houses is, to employ large wooden vats, and to apply the heat by means of pipes laid along the bottom, and supplied with high-pressure steam. This method is less expensive than the use of double steam pans, as above. When essence of guaiacum is not used, 24 lbs. of guaiacum shavings, from which the dust has been sifted, are boiled with the other ingredients instead. (See SARSAPARILLA.)

DECOCTION OF SENEGA ROOT. *Syn.* DEC. OF AMERICAN SNAKEROOT. DEC. SENEGÆ, (P. L.) *Prep.* Seneka root ʒx; water 2 *pints*; boil to one-half, and strain.

Dose. f℥iss to f℥iij, three or four times daily, in humoral asthma, chronic cough, dropsy, &c. It is stimulant, expectorant, and diuretic, and in large doses, emetic and cathartic. It is the antidote employed by the Senegaro Indians against the bite of the rattlesnake. (Dr. Tennant.)

DECOCTION OF SQUILLS, COMPOUND. *Syn.* DEC. SCILLÆ COMP. *Prep.* (P. U. S.) Squills ʒiij; juniper berries ℥iv; snakeroot ℥iij; water lb. iv; boil to one half, strain, and add of sweet spirits of nitre f℥iv.

DECOCTION OF STARCH. *Syn.* MUCILAGO AMYLI, (P. L. 1788–1824.) DEC. AMYLI, (P. L. 1836.) *Prep.* Starch ʒiv; water 1 *pint*; mix gradually and boil for a short time. *Use.* As an enema in dysentery, diarrhœa, and excoriations of the rectum.

DECOCTION OF STEMLESS MILK VETCH. *Syn.* DEC. ASTRAGALI. *Prep.* (P. Cod.) Root of the astragalus escapus ʒx; water 3 *pints*; boil to 1 quart. *Dose.* The whole to be taken within the 24 hours. Alterative, &c.

DECOCTION, STRENGTHENING. *Syn.* TONIC DECOCTION. *Prep.* I. Peruvian bark, bruised, ℥ss; Virginian snakeroot ʒij; water 1 pint; boil to one half, strain, and add spirits of cinnamon ℥iss; diluted sulphuric acid ℥iss. *Dose.* 2 oz. two or three times a day.

II. Decoction of bark ℥v; tincture of bark ʒvj; aromatic confection ℈j; sal volatile ʒj. *Dose.* 1 or 2 tablespoonfuls night and morning.

DECOCTION OF SUET. *Syn.* ARTIFICIAL GOAT'S MILK. DEC. SEVI. *Prep.* (Dr. Cummin.) Tie some chopped mutton suet in a piece of muslin, and simmer it for a short time in milk.

DECOCTION, SYDENHAM'S WHITE. *Syn.* HARTSHORN DRINK. MISTURA CORNU USTI. *Prep.* Prepared burnt hartshorn ℥ij; gum arabic ℥j; water 3 pints; boil to 1 quart and strain. Mucilaginous; demulcent.

DECOCTION OF TAMARINDS. *Syn.* DEC. TAMARINDORUM. *Prep.* Tamarinds ℥iss; water 1 pint; boil for 5 minutes and strain. A pleasant drink in fevers, asthma, chronic coughs, &c.

DECOCTION OF TAMARINDS AND SENNA. *Syn.* DEC. TAMARINDORUM CUM SENNA, (P. E. 1744.) Tamarinds ʒvj; cream of tartar ʒij; water f℥xxiv; boil in a glazed earthen vessel until reduced to f℥xiv; then infuse therein for 12

hours, senna ʒiv; strain, and add sirup of violets ℥j. Purgative.

DECOCTION OF TAR. *Syn.* Tar Water. Dec. Picis liquidæ. *Prep.* Tar 1 oz.; water 1½ pints; boil to 1 pint.

DECOCTION OF TORMENTIL. *Syn.* Dec. Tormentillæ, (P. L.) *Prep.* Tormentil root, bruised, ℥ij; water 1½ pints; boil to 1 pint and strain. Astringent. *Dose.* 2 to 4 tablespoonfuls in diarrhœa, &c.

DECOCTION OF VERBENA. *Syn.* Dec. Verbenæ. *Prep.* Verbena (vervain) 2 oz.; water 1½ pints; boil to 1 pint and strain.

Remarks. The verbena officinalis was formerly highly recommended by Etmuller, Hartman, De Haën, Morley, and others, in scrofula, cephalalgia, &c., but afterwards fell into neglect. More recently, a decoction of the plant has been highly extolled by Boshanov as an anti-febrile.

DECOCTION, VULNERARY. *Syn.* Dec. Vulnerarium. *Prep.* (E. H.) Ground ivy, and broad-leaved plantain, of each ℥ss; water 3 pints; boil to 1 quart, strain, and add sugar ℥ss.

DECOCTION OF WALNUT BARK. *Syn.* Dec. Juglandis. *Prep.* (P. Gen.) Green bark of walnuts ℥j; water 1 pint; boil for 15 minutes and strain.

DECOCTION OF WALL-PELLITORY. *Syn.* Dec. Parietariæ. *Prep.* (Ratier.) Root of wall-pellitory ℥j; water 1½ pints; boil to 1 pint.

DECOCTION OF WHORTLEBERRIES. *Syn.* Dec. Uvæ Ursi, (P. L.) *Prep.* Whortleberry leaves, bruised, ℥j; water 1½ pints; boil to 1 pint and strain.

Dose. 1 to 4 tablespoonfuls, in phthisis and purulent affections of the urinary organs.

DECOCTION OF WILLOW BARK. *Syn.* Dec. Salicis. *Prep.* (Wilkinson.) Willow (salix latifolia) bark, bruised, ℥iss; macerate in water ℔ ij, for 6 hours, then boil for 15 minutes and strain. Tonic, astringent, and febrifuge.

DECOCTION OF WOODY NIGHTSHADE. *Syn.* Dec. of Bitter-sweet. Dec. Dulcamaræ, (P. L.) *Prep.* Stalks of the herb, sliced, ʒx; water 1½ pints; boil to 1 pint and strain.

Dose. 1 to 3 oz. It is diaphoretic, diuretic, and narcotic, and is given in dropsy, asthma, and several scaly skin diseases. Its narcotic action may be obviated by the addition of ½ an oz. of compound spirits of lavender. (Collier.)

DECOCTION OF WORMSEED. *Syn.* Dec. Santonici. *Prep.* Wormseed, bruised, ℥ij; water 1 pint; boil down to f℥xvj, and strain. Stomachic, vermifuge. It is principally used as an injection against ascarides.

DECOCTION OF YELLOW MULLEIN. *Syn.* Dec. Verbasci Thapsi. *Prep.* (Dr. Home.) Yellow mullein ℥j; water 1 pint; boil for a *short* time.

DECOLORATION. The blanching or loss of the natural color of any substance. Sirups, and many animal, vegetable, and saline solutions, are decolored or whitened by agitation with animal charcoal, and subsequent subsidence or filtration. Many fluids rapidly lose their natural color by exposure to light, especially the direct rays of the sun. In this way, castor, nut, poppy, and several other oils, are whitened. By the joint action of light, air, and moisture, cottons and linens are commonly bleached. The peculiar way in which light produces this effect, has never been satisfactorily explained. That it is not dependent on the absorption of oxygen, appears evident, from the fact, that contact with air is not always necessary. I find that raw castor oil, exposed to the sun in a bottle closely corked, will whiten with as much rapidity as that in another similar sized bottle, placed beside it and left uncorked. There is, however, a small quantity of gaseous matter given off, which has an odor resembling carbureted hydrogen; but in the open bottle, oxygen is continually absorbed, certain oily acids formed, and some impure carbonic acid evolved. When this action is permitted to go on for some time, the oil becomes thick and rancid, but may be *partially* restored to its former state, by filtration through coarsely-powdered and freshly-burnt animal charcoal. The latter substance is commonly employed to deprive fish oils of their disagreeable odor, as well as to lessen their color. The decoloration of textile fabrics and solid bodies generally, is called *bleaching*. (See Oils, Tallow, Sirup, Sugar, &c.)

DECOMPOSITION. *Syn.* Decomposition, (*Fr.*) Zersetzung, (*Ger.*) In Chemistry. The resolution of compounds into their elements, or the alteration of their chemical constitution in such a manner that new products are formed.—Thus: the gas that illuminates our streets, is the result of the decomposition of pit-coal; and vinegar and brandy, the result of the decomposition of the saccharine matter of grape juice. The decomposition of bodies may be either *simple* or *complicated*, accordingly as one or more compounds are produced. —Thus: when the vapor of water, (steam,) which is a compound of 8 parts of oxygen and 1 of hydrogen, is passed over red-hot iron, the latter unites with the oxygen, and the hydrogen is liberated in an uncombined state. This resolution of the elements of one body, and the formation of a new compound, is called by chemists, *simple* or *single* decomposition. The above change may be represented by the following diagram:—

Materials.	Composition.	Products.
Vapor of Water	Hydrogen . . Oxygen . .	*Hydrogen gas.*
Iron	Iron	*Oxide of Iron.* (from Oxygen and Iron)

When, however, two bodies suffer mutual alteration, and an interchange of their elements takes place, producing new compounds, it is called *double decomposition*. Thus: when sal ammoniac and chalk are mixed together and distilled, as in the preparation of smelling salts, (sesquicarbonate of ammonia,) the hydrochloric acid of the former unites to the lime of the latter, forming hydrochlorate of lime; while the ammonia of the sal ammoniac unites with the carbonic acid of the chalk, forming sesquicarbonate of ammonia, which passes over and is condensed in the receiver. This mutual decomposition is exhibited in the following diagram:—

Materials.	Composition.	Products
Sal Ammoniac	Hydrochloric Acid, Ammonia . .	*Hydrochl. of Lime.* (Hydrochloric Acid + Lime)
Chalk.	Lime . . . . ., Carbonic Acid	*Sesquicarbonate of Ammonia.* (Ammonia + Carbonic Acid)

For the sake of simplicity, no notice is taken in

plaints, in doses of one-tenth to one-eighth of a grain, (Serre,) and has been proposed as a source of hydrocyanic acid. (Everitt.)

CYANIDE OF ZINC. *Prep.* Dissolve metallic zinc in hot acetic acid, and add hydrocyanic acid as long as a precipitate falls.

CYANOGEN. *Syn.* PRUSSINE. CYANOGENIUM. BICARBURET OF NITROGEN. (From κυανος, *blue*, and γενναω, *to generate.*) A compound of carbon and nitrogen, discovered by M. Gay Lussac, in 1815.

Prep. Expose carefully-dried bicyanide of mercury in a small retort, to the heat of a spirit-lamp, and collect the gas in the mercurial pneumatic trough.

Prop. A colorless gas, possessing a pungent and peculiar odor. Under a pressure of 3 or 4 atmospheres, it becomes liquid at a temperature of 45°, (Faraday,) and this fluid again becomes gaseous on withdrawal of the pressure. Water absorbs nearly 5 times its bulk of cyanogen at 60°, and alcohol about 23 times. With hydrogen it forms hydrocyanic acid, and with the metals, cyanides, or cyanurets. (See CYANIDE and HYDROCYANIC ACID.)

CYANURIC ACID. *Syn.* PYRO-URIC ACID. A peculiar acid, discovered by Scheele. It is a product of the decomposition of the soluble cyanates by dilute acid, of urea by heat, &c.

Prep. Heat urea until it fuses, and is converted into a white or grayish-white mass; dissolve in strong oil of vitriol, and add nitric acid, drop by drop, to the solution until it becomes colorless; then mix the liquid with an equal volume of water. On cooling, crystals of cyanuric acid will be deposited, which must be washed with a little cold water, and then dissolved in 24 parts of boiling water, when crystals of the hydrated acid will form as the solution cools. By exposure to the atmosphere, or a gentle heat, they lose their water and fall into powder.

Prop., &c. It forms salts with the bases called cyanurates. The alkaline cyanurates may be formed by neutralizing a boiling solution of the acid with the base, and the cyanurate of silver by adding a solution of nitrate of silver to another of cyanurate of potassa.

DAHLINE. A substance analogous to starch and inulin, discovered by M. Payen in the bulbs or tubers of the dahlia.

Prep. Diffuse the pulp of dahlia bulbs in its own weight of water, filter through cloth, add $\frac{1}{20}$ part of common chalk, boil for half an hour, and filter. Then press the residuum of the bulbs, mix the liquors, evaporate to $\frac{3}{4}$ths, add 4§ of animal charcoal, clarify with the white of an egg, filter, and evaporate until a film forms upon the surface; as the liquid cools, dahline will be deposited.

Remarks. The bulbs of dahlias yield about 4§ of dahline. It differs from starch and inulin by forming a granulated mass, when its aqueous solution is evaporated; as also in its specific gravity, which is 1·356, whereas that of starch is 1·53.

DAIRY. An apartment either in a house, or adjoining it, for the purpose of keeping milk, and making butter, cheese, &c.

The best situation for a dairy is on the north side of the dwelling-house, because it will thereby be sheltered from the sun during the heat of the day. Ample means should be provided to ensure thorough ventilation by means of Venetian shutters, or suitable windows, so arranged as to admit the air, but to exclude flies and other insects; and also to permit a due regulation of the temperature, which should be preserved as much as possible in an equable state, ranging from 45° to 55° F. To lessen the influence of external variations of temperature, the walls should be double, or of considerable thickness, and the windows provided with shutters or doors. In summer the heat may be lessened by sprinkling water upon the floor, which will produce a considerable degree of cold by its evaporation. Dairies built of mud or "cob," are preferred in the west of England, and this preference arises from the uniform temperature they maintain, on account of the great thickness of the walls, and their being very bad conductors of heat. In large dairy-farms, where butter and cheese are made, the dairy is generally a separate building, and divided into 3 or 4 apartments, one of which is called the *milk-room*, a second the *churning-room*, a third the *cheese-room*, containing the cheese-press, &c., and a fourth the *drying-room*, where the cheeses are placed to dry and harden. To these may be added a scullery, furnished with copper, water, &c., for scalding and cleaning the dairy utensils.

Besides the preservation of the milk, after it has been brought into the dairy, and the manufacture, ripening, and preservation of the cheese and butter, the management of a dairy includes an attention to the health and feeding of the cows. These animals require regular and careful treatment. The cow-stall should be visited at an early hour every morning, and the udder of each cow washed clean with cold water and a sponge, after which they should be milked. If any of the cows have sore teats, warm water should be used, and a little dressing of simple ointment, or a lotion of spirit and water applied. When the former is used, great cleanliness is necessary, and the milk should be given to the pigs.

The operation of milking the cows should be performed at regular and early hours, and each cow should be milked as dry as possible, both morning and evening, as, unless this point be attended to, the quantity of milk will decrease. After each cow has been milked as dry as possible, the dairy-maid should begin again with the one first milked, and proceed to "drip" each of them, by which means not only will the "strippings," which are very rich in cream, be obtained, but the health and productiveness of the animals will be promoted. Cleanliness is very essential in all the operations of the dairy, and in none more so than in the milking of the cows. The hands and arms of the milk-maid should be kept scrupulously clean, and should be well washed with soap and water, after touching the udder of a sick cow, as without this precaution, the sores may be conveyed to the healthy ones. The milk-cans should be scalded out daily, and, as well as all the other dairy utensils, should be kept *clean* and *dry*. Before placing the milk on the shelves of the dairy, it should be strained through a hair-sieve or a searce, covered with clean cheesecloth, as by this precaution, any stray hairs that may have fallen into the milk-pail will be taken out.

It is of importance in the management of cows, that the majority of them should calve from Lady-day to May, that the large quantity of milk that follows, may be supported by the luxuriance of vegetation. The other portion should calve in August or September, to ensure a supply during the winter. The calves should be taken from the cows when 7 or 8 days old, and fed with skimmed-milk, made oatmeal, &c., allowing them to be out in the pasture during some portion of every day, unless it should be wet and cold.

The average produce of a milch cow, supplied with good pasturage, is about 3 gallons daily, from Lady-day to Michaelmas, and from that time to February, about 1 gallon daily. Cows of good breed will be profitable milkers to 14 or 15 years of age, if well fed. (See BUTTER, COWS, CREAM, and CHEESE.)

DAMP LINEN is very injurious to health, and should be especially avoided. In travelling, when it is expected that the bed has not been properly aired, the best way is to sleep between the blankets. A good plan to ascertain this point, is to have the bed warmed, and immediately after to introduce a clean, dry glass tumbler between the sheets, in an inverted position; after it has remained a few minutes it should be examined, when if found *dry*, and untarnished with steam, it may be fairly presumed that the bed is perfectly safe; but if the reverse should be the case, it should be avoided. When it is impossible to prevent the use of damp linen, as articles of dress, the best way to obviate any ill effects, is to keep constantly in motion, and avoid remaining near the fire, or in a warm apartment, or a draught of cold air, until sufficient time has elapsed to allow the escape of the moisture.

DAMSONS. A species of small black plum, much used in the preparations of tarts, &c. They are rather apt to disagree with delicate stomachs, and also to affect the bowels.

DAMSON CHEESE. *Prep.* Boil the fruit in a sufficient quantity of water to cover it; strain the pulp through a very coarse sieve; to each lb. add 4 oz. of sugar. Boil till it begins to candy on the sides, then pour it into tin moulds. Other kinds of plums may be treated in the same way, as also cherries, and several other kinds of fruit.

DANDELION. *Syn.* LEONTODON. LEONTODON TARAXACUM. The root of this plant is diuretic and tonic. It is roasted and used as coffee, and when mixed with an equal weight of foreign coffee, constitutes the article once so much puffed under the name of "Dandelion coffee." The blanched leaves are used in salads, and the inspissated juice, extract, and decoction are employed in medicine, and are considered as detergent, aperitive, and deobstruent.

DAPHNIN. A peculiar bitter principle, discovered by Vauquelin in the daphne alpina. It is procured by separating the resin from the alcoholic tincture of the bark by evaporation; afterwards diluting with water, filtering, and adding acetate of lead. A yellow substance, which has been called daphnate of lead, falls down, which, when decomposed by sulphureted hydrogen, forms small transparent crystals of daphnin. This substance is bitter, gray-colored, volatile, and sparingly soluble in cold water.

DATURA. *Syn.* DATURIA. DATURINA. DATURIUM. An organic alkali, discovered by Geiger and Hesse in datura stramonium. It is best obtained from the seeds. It is sparingly soluble in cold water; but more so in hot water, alcohol, and ether. It tastes bitter, dilates the pupil strongly, and is very poisonous. It may be sublimed unaltered, and may be obtained in prismatic crystals, by the addition of water to its alcoholic solution. With the acids it forms salts, which are mostly crystallizable. (See ALKALOID.)

DEAFNESS. *Syn.* DYSECŒA, (from δυς, *with difficulty*, and ακοη, *hearing*,) an imperfect state, or deficiency of the faculty of hearing. Deafness has been divided into two species:—1. *Organic*, arising from wax in the meatus, injuries of the membrane, or inflammation and obstruction of the tube. 2. *Atonic*, when without any discernible injury of the organ. (Cullen.) When deafness is present in infancy and childhood, it is accompanied with dumbness, or imperfect articulation, in consequence of the impossibility of conveying a knowledge of the sounds necessary for the exercise of the imitative faculty of speech. A common cause of deafness is some imperfection or obstruction of the passage leading to the membrane of the tympanum or drum of the ear. In some cases this passage is totally occluded by a membrane, or some malformation of the tube, which may frequently be removed by a surgical operation. Even instances of partial obliteration of this passage have occurred, which have been effectually cured. A more frequent cause of deafness is, however, the presence of foreign bodies in the aural passages, or the accumulation of hardened wax. In these cases the best treatment is to inject warm water into the ear by means of a proper syringe, the head being placed with that side upwards during the operation. Insects may be destroyed by pouring a spoonful of warm olive oil, or camphorated oil, into the ear over night, retaining it there until the next morning by means of a piece of cotton wool, when it may be washed out with a little mild soap and warm water. When there is a deficient secretion of wax, or a dryness of the aural passage, mild oleaginous stimulants should be employed. For this purpose a little olive or almond oil, to which a few drops of oil of turpentine, oil of juniper, or camphor liniment, have been added, may be used with advantage. When deafness is accompanied with continued acute pain, or a discharge of a purulent matter, inflammation of the tympanum, or some other portion of the internal ear, probably exists, and medical advice should be sought as soon as possible. The deafness that frequently accompanies a violent cold, is generally caused by obstructions in the Eustachian tube, and goes off as soon as the secretions return to a healthy state. When imperfect hearing depends upon obtundity of the auditory nerve, or an extensive obliteration or malformation of the internal ear, it scarcely admits of cure.

DEAFNESS, TAYLOR'S REMEDY FOR. *Prep.* Oil of almonds ℔.j; garlic, bruised, ℥ij; alkanet root ℥ss; infuse and strain. A little is poured into the ear in deafness.

DEATH. In cases of sudden death, interment should be deferred till signs of putrefaction begin to appear, especially when no gradation of disease

per day. The grass being cut and carried, will economize it full ¼. The annual product of a good fair dairy cow, during seven months after calving, and either in summer or winter, if duly fed and kept in during the latter season, will be an average of 7 lbs. of butter per week, from 3 to 5 gallons of milk per day. Afterwards, a weekly average of 3 or 4 lbs. of butter from barely half the quantity of milk. It depends on the constitution of the cow, and how nearly she may be milked to the time of her calving, some giving good milk until within a week or two of that period, others requiring to be dried 8 or 9 weeks previously. I have heard (says Mr. Lawrence) of 20 lbs. of butter, and even 22 lbs., made from the milk of 1 long-horned cow in 7 days; but I have never been fortunate enough to obtain one that would produce more than 12 lbs. per week, although I have had a Yorkshire cow which milked 7 gallons per day, yet never made 5 lbs. of butter in one week. On the average, 3 gallons of good milk will make 1 lb. of butter.

CRACKNELS. *Prep.* Mix a pint of flour with a little grated nutmeg, the yelks of 2 eggs, 2 or 3 spoonfuls of rose-water, and cold water sufficient to make a paste; then roll in ½ lb. of butter, and make it into shapes. In 1 hour put them into a kettle of boiling water, and boil them until they swim, then throw them into *cold* water; take them out, and when dry bake them on tins.

CRACKNUTS. *Prep.* Flour 1 lb.; sugar ¾ lb.; melted butter ½ lb.; 6 or 7 eggs, well beaten; make a paste with a glassful of raisin wine and a little water; add caraways, roll it out as thin as paper, cut it into shapes with a tumbler, wash the pieces with the white of egg, and dust them over with powdered sugar.

CRAMP. Spasmodic or involuntary contractions of the muscles, generally of the extremities, accompanied with great pain. The muscles of the legs and feet are those most commonly affected with cramp, especially after great exertion. The best treatment is immediately to stand upright, and to well rub the part with the hand. The application of strong stimulants, as spirits of ammonia, or of anodynes, as opiate liniments, has been recommended. When cramp occurs in the stomach, a teaspoonful of sal volatile in water, or a dram glassful of good brandy, should be swallowed immediately. When cramp comes on during cold bathing, the limb should be thrown out as suddenly and violently as possible, which will generally remove it, care being also taken not to become flurried nor frightened; as presence of mind is very essential to personal safety on such an occasion. A common cause of cramp is indigestion, and the use of acescent liquors; these should be avoided, and bitters and absorbents had recourse to.

CRAYONS. Small cylinders or pencils of coloring substances, used for drawing upon paper, &c.

Prep. Crayons are commonly prepared by mixing up the color with some substance that will dilute it to a proper shade, and give it the necessary softness and tenacity to adhere readily to paper, when rubbed against it. The cylindrical form is generally given to them by means of a cylinder of 2 or 3 inches diameter, having one end open, and the other firmly secured to a perforated plate, having holes of the same size as the intended crayons. The crayon-composition, in the state of a stiff paste, is introduced into the open end, and is driven down and through the holes, by means of a small plug or piston, that exactly fits the inside of the cylinder. To impart an equable motion, which is essential to the formation of well-shaped crayons, a small screw is employed. The pieces that pass through the holes are cut into lengths and dried. All the materials employed in making crayons are previously reduced to the state of an impalpable powder, and those that are gritty are elutriated or washed over. The following are among the best formulæ for making crayons:

I. Spermaceti 3 oz.; boiling water 1 pint; agitate together till they form a species of emulsion, with which mix up bone ashes 1 lb., (previously reduced to an impalpable powder,) and coloring matter as much as is required to give the proper tint. When half dry form the mass into crayons.

II. Pipeclay, and the finest prepared chalk, equal parts; or pipeclay alone, q. s.; coloring a sufficient quantity. Make them into a paste with pale mild ale.

III. (*Process of the brothers Joel, of Paris.*) Shellac 3 parts; spirits of wine 2 parts; oil of turpentine 1 part; coloring matter and blue clay, of each 6 parts. The shellac is dissolved in the spirit, and well mixed by trituration with the clay, (previously elutriated and dried,) the colored powder, and the turpentine; the mass is then made into crayons, which are dried by a stove heat.

IV. White curd or Castile soap, cut into thin shavings, 1 oz.; boiling water 1 pint; dissolve, and when cold add gradually as much rectified spirit of wine as will barely render the liquid transparent. With this fluid make the coloring matter into a paste, along with ½ its weight each of the finest elutriated clay and chalk.

V. Shellac 5 parts; wood naphtha 10 parts; dissolve, and with this fluid mix up the coloring powder, previously stirred up with an equal weight of fine blue clay. Dry the crayons by a stove heat. If this process be well managed, it will produce crayons equal to those of the best Parisian houses.

VI. (*Colored crayons.*) Crayons may be made of any color or shade, by employing suitable pigments, and diluting them with a proper quantity of elutriated or prepared chalk. *White crayons* are made of this substance, by simply combining it with a suitable quantity of pure clay, or by mixing it up in either of the ways just described. *Black crayons* are made of prepared blacklead, ivory-black, lamp-black, &c. Black chalk is frequently made into crayons by simply sawing it into suitably-sized pieces. *Red crayons* have, as their coloring ingredients, carmine, carminated lakes, vermilion, and any of the earthy or mineral colors commonly used as pigments. General Lomet has proposed, as a superior red crayon, the softest hematite, elutriated, dried, and made into a paste with water holding in solution a little gum and soap. *Blue crayons* are made of indigo, smalts, Prussian blue, verditer, &c. *Green crayons* of a mixture of king's yellow, or yellow ochre, with blues. *Yellow crayons* of king's yellow, Naples ditto, yellow ochre, &c. *Brown crayons* of umber, (raw and burnt,) terra di sienna, (raw and

burnt,) Cullen's earth, brown ochre, &c.; and some peculiar shades, of a mixture of black, carmine, and either of the above colors. *Purple crayons* are made with any of the more brilliant blues, mixed with carmine, lake, or vermilion.

Remarks. As crayon colors do not admit of being mixed together at the time of using them, like liquid colors, it is usual to make 3 to 6 different shades of each color, so as to enable the artist at once to produce any effect he chooses.

CRAYONS, LITHOGRAPHIC. *Prep.* I. Tallow soap 7 parts; white wax 6 parts; melt by a gentle heat, add lamp-black 1 part, and cast it into moulds.

II. White wax 4 parts; shellac and hard tallow soap, of each 2 parts; lamp-black 1 part; as last.

III. Spermaceti, white wax, and hard tallow soap, of each equal parts; lamp-black to color; as last.

Use. To draw designs on lithographic stones.

CREAM. The oleaginous portion of milk, which collects in a thin stratum upon the surface, when that fluid is left undisturbed for some time. By the process of churning, it is converted into butter. When kept for some days, it becomes thicker, and partially coagulated, in consequence of the formation of some lactic acid, which precipitates the caseous matter contained in the small portion of the milk with which the cream is mixed. If cream in this state be violently shaken, as in the operation of churning, the oily portion, or butter, quickly separates, and leaves a liquid behind, called *buttermilk.* If instead of churning it, we suspend it in a linen bag, and allow it to drain, it will gradually become drier and harder by the separation of the liquid portion, and will then form what is known by the name of cream cheese. By the application of *slight* pressure, the separation of the whey is more completely effected, and the product is not only better, but will keep longer. When cream is intended for churning, it should be kept until it turns *slightly* sour, as then the butter will readily "*come;*" for if churned while quite sweet, the operation will be tedious, and frequently fail. When this happens, the dairy maids declare the milk is "*charmed,*" or "*bewitched,*" and reluctantly proceed with the operation. The cause of this is the want of acidity, which is not the case when the cream has been kept for a certain time before churning, for then a portion of the sugar contained in the serum is converted into lactic acid. The addition of a little rennet, or vinegar, is the proper remedy in this case, and will cause the almost immediate appearance of the butter.

The term "*Cream*" is also frequently applied to some compound spirits and cordial liquors, because of their cream-like smoothness and flavor.

Qual. The cream of milk may be regarded as an article of food in the same light as butter, as it is converted into the latter by the process of digestion, especially when violent exercise follows after eating it. On this account much cream should never be taken at once by persons of delicate stomachs. In eating cream with fruit, persons are hardly aware of the large quantity they consume, until they find it disagree with their stomachs, when the condiment is blamed for the indiscretion of those who take it

CREAM, ALMOND. *Prep.* Sweet almonds 2 oz.; bitter almonds 4 in number; blanch and beat them in a mortar to a *smooth paste,* adding a teaspoonful of water to prevent oiling. Mix this with a pint of cream, the juice of a lemon, and enough powdered lump sugar to sweeten; whisk up a froth, take it off and lay it on a clean sieve; then fill glasses with the liquor, and place some of the froth on the top of each.

CREAM, BRANDY. *Prep.* Mix a teacupful of almond cream with ½ a pint of milk; boil for 2 minutes, and when cold, add the yelks of 6 eggs and a quart of cream; heat it gently over the fire until it thickens, keeping it well stirred; then add 2 or 3 glasses of brandy, and pour it into small cups or shallow glasses.

CREAM, BURNT. *Prep.* Cream 1 quart; cassia a small stick; the peel of half a lemon; boil for 5 minutes; let it cool a little and take out the spice; then add the yelks of 9 eggs, and sugar to sweeten; stir until cold, put it into a dish, strew powdered sugar over it, and bake it until brown.

CREAM, COLD. *Syn.* GALEN'S CERATE. CERATUM GALENI. *Prep.* I. Oil of almonds 1 lb.; white wax ¼ lb.; melt together in a water-bath, strain, if necessary, and add by degrees rose water (made warm) ¾ pint; stir assiduously until cold.

II. Olive oil and rose water, of each 1 pint; spermaceti and white wax, of each 4 oz.; as last.

III. White lard 1 lb.; spermaceti ¼ lb.; orange flower water ¼ pint; as last.

Remarks. The above may be further scented by the addition of any fragrant essence or oil, if desired. It is used as a mild unguent to soften the skin, prevent chaps, &c.

CREAM, COLD, (HUDSON'S.) *Prep.* Oil of almonds 4 oz.; white wax and spermaceti, of each ½ oz.; rose water 4 oz.; orange flower water 1 oz.; as last.

CREAM, COSTOPHIN. Named after a village near Edinburgh, where it is commonly made. *Prep.* Put the milk of 3 or 4 consecutive days, together with the cream, into a vessel, and allow it to remain until sour and coagulated. The whey must be now drawn off, and fresh cream added. It is eaten with sugar and fruit, especially strawberries and raspberries.

CREAM, DEVONSHIRE RAW. Sour cream mixed with an equal quantity of fresh cream, and sweetened with sugar. Eaten with fruit.

CREAM, DEVONSHIRE SCALDED. *Syn.* CLOUTED CREAM. *Prep.* Set the milk of yesterday in a polished shallow brass pan, over a charcoal or other clear fire, free from smoke, and gradually heat it very hot, but be careful not to let it boil. It is readily known to be done enough when the undulations on the surface look thick, and form a ring round the top of the fluid, the size of the bottom of the pan. Let it cool, and the next day skim off the cream. It is eaten with sugar and fruit, and is made into butter.

CREAM, D'ILLOTTE'S VEGETABLE. *Syn.* CRYSTALLIZED CREAM. *Prep.* Oil of almonds 2 oz.; spermaceti ½ oz.; melt and add bergamotte, neroli, and verbena, of each 5 drops; huile au jasmin 10 drops. Stir well together, and pour it into small wide-mouthed bottles to crystal-

white powder. In this state it is freely soluble in water. It appears from experiments, that 1 part of diastase will convert 2000 parts of starch into grape sugar. Malted barley is said to contain $\frac{1}{500}$ part of this substance; yet this small portion is quite sufficient to convert the starch of the malt into sugar during the operation of mashing, provided this be properly conducted. "The most favorable temperature for this conversion is 140° to 149° Fahr. It is also of the utmost importance that the saccharification should take place as speedily as possible, so that the sugar produced may not remain in contact with much gummy matter, in which case the diastase will not convert the latter into sugar. In fact, the liquefaction and saccharification should proceed simultaneously." (M. Guerin Varry.)

Hence it would appear that the Scotch system of ale-brewing is, in this latter respect, most excellent, and if the mashing were conducted at a lower temperature, would be almost perfect. It has been proved by experience, that the richest and sweetest extracts of malt are obtained by employing water at a heat ranging from 157° to 160° F., beginning at the lowest of these temperatures. Where three mashings are made, the mean temperature of each mash should be respectively,—145°,—160°,—175° F. (See BREWING, and FERMENTATION.)

DIET. "The dietetic part of medicine is no inconsiderable branch, and deserves a much greater share of regard than it commonly meets with. A great variety of diseases might be removed by the observance of a proper diet and regimen, without the assistance of medicine, were it not for the impatience of the sufferers. On all occasions, it may come in as a proper assistant to the cure, which sometimes cannot be performed without a due observance of the non-naturals." The following tables will convey to the reader the meaning of the terms, *low diet*, *full diet*, &c.

Low Diet.

Breakfast and Tea.—Warm new milk and water; weak black tea, its astringent properties corrected by a due addition of milk. Gruel, toasted bread, at least one day old, and without butter. Rusks sopped in the above fluids.

Dinner.—Gruel, new milk and arrow-root, sago, or tapioca; chicken and veal broths; roasted apples; light bread puddings. Pastry of every description must be avoided.

Supper.—Gruel, arrow-root.

Occasional drinks.—Filtered or spring water; toast-and-water made with toasted bread or browned biscuit; barley-water; whey; lemonade, of subdued acidity. Sweet oranges may be freely taken, if the sense of thirst be oppressive.

Middle Diet.

Breakfast and Tea.—Same as in low diet, with the addition of mixed tea.

Luncheon, (if required.)—A cup of arrow-root, sago, tapioca, with biscuit, or two or three bars of toasted (stale) bread; or these with oranges.

Dinner.—In addition to "low diet," boiled chickens; calves' and sheep's feet, stewed; mutton broth; beef tea; boiled soles, whiting, turbot, &c.; lamb; potatoes, asparagus, light bread or rice pudding, roasted apples. After the repast, may be taken one glass of port, old sherry, or madeira wine, diluted with at least twice its quantity of water.

Supper.—A cup of gruel, sago, tapioca, or arrow-root.

Full Diet.

Breakfast and Tea.—Same as in "middle diet;" in addition to which may be taken coffee or chocolate. Stale or toasted bread, sparingly buttered.

Luncheon.—A biscuit and a glass of table-ale or porter.

Dinner.—The "middle diet" bill of fare may be augmented by mutton-chops, rump-steaks, roast or boiled fresh meats, fruit pies, (avoiding the pastry,) baked or boiled rice or tapioca puddings. At this meal table-beer or porter may be taken as common drink, and after it, one or two glasses of port, old sherry, or Madeira.

Supper.—Same as in "middle diet."

An additional glass of wine at dinner or luncheon, will convert this "*full*" into "*generous*" diet.

Milk, Farinaceous, Vegetable, and Fruit Diet.

The articles of food within this range are milk, eggs lightly boiled, gruel, sago, arrow-root, tapioca, isinglass, wheaten and barley bread, rice, potatoes, carrots, parsnips, turnips, artichokes, peas, cauliflowers, cabbage, spinage, water-cress, celery. Fruit may be regarded rather as a luxury than as nutriment; however, when taken in moderation, it is wholesome; when to excess, poisonous. Stone fruit, as nectarines, apricots, peaches, plums, and cherries, are the least digestible, and should never be taken but when ripe; apples and pears are not so apt to run into the acetous fermentation as stone fruit, but, unless ripe and well-masticated, had better be eaten cooked. Oranges, gooseberries, (avoiding the skins,) grapes, without the husks and seeds, currants, ripe strawberries and raspberries, follow consecutively in the order in which they are here enumerated, the first being most easy of digestion. Notwithstanding such an ample store of materials, the selection must of course depend upon season, appetite, and the known effects of each upon individual constitutions.

DIETETIC COMPOSITION. *Prep.* Powdered sago and patent cacao, equal parts; mix. It is used like arrow root.

DIGITALIN. *Syn.* DIGITALIA. DIGITALINA. An alkali discovered by M. Royer in the digitalis purpurea.

Prep. Digest 1 lb. of foxglove in ether, first in the cold and then heated under pressure; when it has again become cold, filter, and distil off the ether, dissolve in water, and again filter; treat the solution with hydrated oxide of lead, gently evaporate the whole to dryness, and again digest in ether. From this solution the alkali may be obtained by evaporation. By repeated re-solutions it may be procured in a crystalline state.

Remarks. As obtained above, it forms a brown mass, faintly alkaline to test paper. It is powerfully poisonous, and is said to possess the same properties as digitalis, but in a very concentrated degree.

DILUENTS. (From *diluo*, I wash away.) Aqueous liquors, so named because they increase

the fluid portion of the body. Tea, barley-water, water gruel, and similar articles are the most common diluents, after pure water. The copious use of liquids of this class is recommended in all acute inflammatory diseases, and to promote the action of diuretics and sudorifics.

DIOSMIN. A bitter extractive matter obtained by Brande, from buchu leaves. It is very soluble in water, but not in alcohol and ether.

DISINFECTANTS. Agents which destroy miasmata. The principal of these are chlorine, the chlorides of lime and soda, the fumes of nitric and nitrous acids, heat, and ventilation. The last two are the most efficient and easily applied. The clothing, bedding, &c. of patients laboring under contagious diseases, may be effectually disinfected by exposure to a temperature of about that of boiling water. Neither the texture nor color of textile fabrics is injured even by a heat of 250° Fahr. It is a practice at some of the workhouses to bake the clothes of the paupers who have the itch, or are infested with vermin. Quicklime rapidly absorbs carbonic acid, sulphureted hydrogen, and several other noxious gases, and is therefore commonly used as a wash for the walls of buildings. Acetic acid, camphor, fragrant pastiles, cascarilla, and other similar substances, are frequently burnt or volatilized by heat, for the purpose of disguising unpleasant odors. The sulphates of iron and lime have the property of rapidly destroying noxious effluvia. A quantity of either of these sulphates thrown into a cesspool, for instance, will in a few hours remove the fetid smell.

DISTILLATION. *Syn.* DISTILLATION, (*Fr.*) BRANNTWEINBRENNEREI, (*Ger.*) IN CHEMISTRY:—The evaporation and subsequent condensation of fluid, by means of a still and refrigerator, or other similar apparatus. IN COMMERCIAL LANGUAGE, the term is applied to the manufacture of spirituous liquors

The discovery of the art of distillation is usually ascribed to the alchemists, but there appears to be good reason to suppose that it was known in more remote ages to the Arabians and other eastern nations, to whom it probably descended from the ancient Babylonians. Certain it is, however, that a rediscovery of the process was made by some of the northern nations of Europe, and that the first notice of it appears in the writings of Arnoldus de Villa Nova, and his pupil Raymond Lully, by whom spirit, or *aqua vitæ*, as it was called, was declared to be "an emanation of the deity; an element newly revealed to man, and destined to restore the energies of modern decrepitude," and that the discovery of this fluid indicated the consummation of all things, and the end of the world.

The process of distillation, as carried on in the distilleries of Great Britain, may be divided into *four* general operations, viz.—*The mashing* or formation of a saccharine infusion, from certain vegetable matters, as malt, barley, oats, rye, &c.;—*the cooling* of this wort or liquor; *the fermentation* or process by which the sugar of the cooled wort is converted into alcohol; and *the separation of the spirit* so formed by means of a still and refrigerator. By the *first* operation, the materials for the formation of the alcohol are obtained; by the *second*, they are brought to a temperature most favorable to the transformation that takes place in the *third*, after which it only remains to free the product of the last operation from the foreign matter with which it is associated: this is done in the *fourth*, and, correctly speaking, constitutes the only part of the process which can be called *distillation*.

The general principles of the first three of the preceding operations, are noticed in the articles BREWING, DIASTASE, and FERMENTATION. It will there be seen, that the amylaceous or starchy matter of the grain is first saccharified and afterwards converted into alchohol, and that certain precautions are necessary to render the process successful and economical. In many of the distilleries of Great Britain, molasses and analogous saccharine substances are employed, in which case the vegetable principle (sugar) essential to the formation of alcohol, is already present, and merely requires simple solution in water of a proper temperature, to be ready to be subjected to immediate fermentation. In general, however, the sources of spirit in England are the various kinds of grain; barley, wheat, and rye, are those commonly employed These are ground and mixed with bruised malt in various proportions, and are mashed in a similar manner to malted grain. The fermentation is carried on until the density of the liquor ceases to lessen, or *attenuate*, which is determined by an instrument called a saccharometer. When this point is arrived at, it is submitted to distillation, to prevent the access of the acetous fermentation, which would lessen its alcoholic value.

During the process of distilling off the spirit of the fermented "wash" or wort, a hydrometer is employed to ascertain its strength, and as soon as the liquor that passes over acquires a certain degree of weakness, the operation is stopped and the spent wash removed. The spirits obtained by the first distillation are generally called "*low wines*," and have a specific gravity of about ·975. By rectification or "*doubling*," a crude milky spirit, abounding in oil, at first comes over, followed by clear spirit, which is received in a separate vessel. The process is continued until the alcoholic content of the distilled liquor diminishes to a certain degree, when the remaining weak spirit that comes over, called "*faints*," is caught separately and mixed with the *low wines*, preparatory to another distillation. The strongest spirit passes over first, and the condensed liquor gradually becomes weaker, until it ceases to contain alcohol. It will thus be seen, that by receiving in separate vessels any given portion of the product, spirit of any required strength within certain limits may be obtained. It is found from experience, and is readily accounted for by theory, that the lower the temperature at which the distillation is conducted, the stronger will be the product, and the less quantity of oil or other volatile matter will come over along with it. To promote this, it has been proposed to carry on the process in vacuo, but on the large scale this has never been adopted. The distillation of the "*wash*" is usually carried on in a separate set of stills, to those employed for the rectification of the *low wines*. For very strong and tasteless spirit, a third, and even a fourth rectification takes place, conjointly with other methods to abstract the water, and to remove any foreign matter that vitiates its odor or flavor. A portion

of soap is put into the still with the wash to prevent excessive frothing.

The quantity of spirit obtained from various substances, and even from pure sugar, depends upon the skill with which the several operations are conducted. By theory, pure sugar should yield 51% of alcohol, but in practice 1 gallon of proof spirit is the utmost obtained from 10 lbs. of sugar. According to Harmstædt, 100 lbs. of starch yield 35 lbs. of alcohol, or 7·8 gallons of proof spirit; and 100 lbs. of the following grains, produce the accompanying quantities by weight of spirit of sp. gr. ·9427, or containing 45 per cent. of pure alcohol; wheat, 40 to 45%; rye, 36 to 42%; barley, 40%; oats, 36%; buckwheat, 40%; maize, 40%; the mean being, 3·47 gallons of proof spirit. It is found that a bushel of good malt yields 2 gallons of proof spirit, and that the maximum quantity of proof spirit obtained from raw grain, mashed with one-fifth or one-sixth of malt, does not exceed 22 gallons per quarter.

By the excise laws, the distiller is restricted in the density of his worts, to sp. gr. between 1050 and 1090; and in Scotland, between 1030 and 1075; nor is a distiller allowed to mash and distil at the same time. (See ALCOHOL, FERMENTATION, STILL, BRANDY, GIN, &c.)

DIURETICS. (DIURETICA, from διὰ, *through*, and οὖρον, *the urine.*) Medicines which promote the secretion of urine. The principal diuretics are *aqueous fluids*,—which act by increasing the watery portion of the blood,—and certain substances which promote the secretion of urine, by stimulating the kidneys. Among the former may be classed nearly all aqueous liquids, as most of them produce diuresis, if the skin be kept cool. Among the latter, may be mentioned the nitrate, acetate, and bitartrate of potassa; oils of juniper, turpentine, cajeput, and copaiba; dilute spirit, and sweet spirits of nitre; decoction of common broom, &c.

DOORS. Much annoyance is sometimes experienced from the creaking of doors. This may be prevented by rubbing a little soap, or a mixture of tallow and blacklead on the hinges.

DRACINE. *Syn.* DRACONIN. A red vegeto-alkaline body, discovered by M. Melandre in dragon's blood.

Prep. Dissolve dragon's blood in alcohol, filter, concentrate, add cold water, and collect the spongy precipitate. Wash this well, neutralize with dilute sulphuric acid, and again wash well with water.

Prop., &c. Dracine has a fine red color; is tasteless, inodorous, flexible, and fuses at 131° F. The most remarkable property is, that the smallest quantity of carbonate of lime in filtering-paper, may be detected by sulphate of dracine, the yellow color instantly turning red.

DRAGON'S BLOOD, (FACTITIOUS.) *Prep.* Shellac 4 lbs.; melt, remove from the fire, and add Canada balsam 5 oz.; and coarsely-powdered gum benzoin 2 oz.; when well mixed, stir in red sanders wood and Venetian red, (both in fine powder,) of each 1 lb.; blend well together, and form into sticks.

Remarks. The above may be distinguished from genuine dragon's blood, by its partial solubility in alcohol. It makes, however, a very fine colored powder, but for varnishes is better without the Venetian red.

DRAUGHT. *Syn.* HAUSTUS, (*Lat.*) IN PHARMACY: a single dose of liquid medicine. Draughts are almost exclusively extemporaneous, and differ from mixtures only in quantity. They are generally dispensed in two-ounce vials.

DRAUGHT, ANTACID. *Syn.* HAUSTUS ANTACIDUS. *Prep.* I. (Collier.) Compound tincture of cardamoms f℈j; solution of bicarbonate of magnesia (fluid magnesia) f℈ix; mix.

II. (Thomson.) *a.* Magnesia ℈j; peppermint water f℥iss; tincture of orange-peel f℈j; mix. In heartburn, and acidity of the stomach.

b. Liquor of ammonia 16 drops; almond mixture f℈ij; laudanum 10 drops. In acidities of the primæ viæ, 2 or 3 times daily.

III. Carbonate of soda 20 grs.; compound infusion of gentian and water, of each f℈vj; tincture of hops f℈j; mix. In dyspepsia, heartburn, &c, twice a day.

DRAUGHT, ANTI-EMETIC. *Syn.* HAUSTUS ANTI-EMETICUS RIVIERI. (P. Cod.) *Prep* Bicarbonate of potassa ℈ss; water f℥iij; lemon sirup f℥j; lemon juice f℥ss; mix, and cork securely in a strong bottle.

DRAUGHT, ANTISEPTIC. *Prep.* (Collier.) Decoction of yellow cinchona bark f℥j; laudanum 5 drops; spirit of pimento f℈ij; mix. In putrid fevers, gangrene, &c.

DRAUGHT, ANTISPASMODIC. *Prep.* I. (Collier.) Tincture of castor f℈j; sulphuric ether 10 drops; peppermint water f℥iss; mix. In hysteria, and that species of irregular muscular action dependent on debility.

II. (Thomson.) *a.* Musk mixture f℈xiv; liquor of ammonia 16 drops; tincture of castor f℈j; sirup of poppies f℈ss; mix. Three or four times daily, in hysteria and convulsive affections, after the bowels have been well cleared out.

b. Oil of aniseed 10 drops; magnesia 20 grs.; tincture of senna f℈ij; peppermint water f℈x; mix. In flatulence and spasms of the stomach.

DRAUGHT, APERIENT. I. (*Haustus aperiens niger*, Paris.) Infusion of senna f℥j; tinctures of senna and jalap, of each f℈j; tartrate of potash ℈j; sirup of senna f℈j; mix.

II. (*Haustus aperiens effervescens*, Dr. Young.) *Prep.* Crystals of carbonate of soda ℈iiss; water 8 oz.; cream of tartar ℈iij; mix, in a soda-water bottle, and cork instantly. It should be drunk while effervescing.

III. (*Seidlitz.*) Sesquicarbonate of soda 50 grs.; potassio-tartrate of soda 2 dr.; water 6 oz. dissolve, and add tartaric acid 40 grs.

DRAUGHT, AROMATIC. *Syn.* HAUSTUS AROMATICUS CUM RHEO. *Prep.* (St. B. H.) Aromatic confection ℈j.; infusion of rhubarb and cinnamon-water, of each, f℈vj; mix. In diarrhœa, &c.

DRAUGHT, ASTRINGENT. *Prep.* I. (Dr. Paris.) Chalk mixture ℥iss; laudanum 15 drops; tincture of catechu f℈j; mix. Both this and the last are excellent in diarrhœa, after the bowels have been first cleared out with a purgative. One may be taken after each motion.

II. (Thomson.) Extract of logwood 12 grs.; cinnamon water f℈xv; tincture of catechu f℈j. In diarrhœa, dysentery, &c.; as last.

, Sassafras chips 1 lb.; ginger bruised 4 oz.; r 3 gallons; simmer until reduced to 2 gal- then add treacle 16 lbs., rectified spirits 7 and laudanum 1 pint.

. Opium ½ oz.; treacle 5 lbs.; boiling water lon; dissolve, and add rectified spirit ½ pint; sassafras ½ dr.; cloves, mustard seed, of each ; corianders and caraway seeds, of each 1 dr.; t for a week.

. Caraway, corianders, and aniseed, of each ; water 6 gallons; distil 5 gallons, and add e 28 lbs.; mix, then add laudanum 1 quart, oil of sassafras 1 oz. previously dissolved in ied spirit 1 gallon.

marks. The above forms are those commonly nt in the drug trade. This cordial is anodyne narcotic, and is commonly given to children led with wind or colic. Its frequent and ex- re use has sent many infants prematurely to grave. Gray says, "*It is chiefly used to pre- the crying of children in pain or starving.*" dose is ¼ of a teaspoonful and upwards, ac- ing to the age of the child.

CORDIAL, GOUT. *Prep.* Rhubarb, senna, ander seed, sweet fennel seed, and cochineal, ach 2 oz.; liquorice root and saffron, of each 1 ; raisins 2½ lbs.; rectified spirit of wine 2 gal- ; digest for 14 days. Used in gout and rheu- ism. *Dose.* 1 tablespoonful to ½ oz. It is matic and slightly laxative.

CORDIAL, HORSE. *Prep.* Compound tinc- of benzoin 1 pint; compound spirit of ammo- and sweet spirits of nitre, of each 8 oz.; mix; it up in Bateman's bottles, and seal them.

CORDIAL LEMON. *Prep.* Digest 2 oz. h of fresh and dried lemon peel, and 1 oz. of h orange peel in 1 gallon of proof spirit for a ek; strain with expression, add clear soft water reduce it to the desired strength, and lump su- , in the proportion of 2½ lbs. to 3 lbs. to the gal- . The addition of a little orange-flower or rose- ter improves it.

CORDIAL, LOVAGE. *Prep.* Fresh roots of age 2 oz.; fresh roots of celery and sweet fen- , of each 1 oz.; essential oil of caraway ¼ oz.; of spirit 3 gallons; digest for 7 days, add wa- r 1 gallon; distil off 2½ gallons; add water to ke it of the desired strength, and sweeten with sugar. To the above ingredients some per- s add, before distillation, ¼ oz. of fresh valerian t, and 1 drachm of oil of savine.

CORDIAL, NERVOUS. (BRODUM'S.) *Prep.* inctures of gentian, calumba, cardamoms, and chona, compound spirits of lavender, and steel ne, of each equal parts. Tonic and stomachic.

CORDIAL, ORANGE. Like lemon cordial, lb. fresh orange peel to the gallon.

CORDIAL, PEPPERMINT. *Syn.* SPORTS- n's CORDIAL. EAU DE CHASSEURS. *Prep.* Add glish oil of peppermint 2 oz. to rectified spirit of ne 1 quart, agitate well in a corked bottle, ca- ble of holding 3 pints or more, then pour it into cask having a capacity of upwards of 100 gal- s; add 36 gallons of perfectly white and fla- less proof spirit, agitate well for 10 minutes, n add 2 cwt. of the best refined lump sugar, eviously dissolved in twice its weight of pure tered rain water; rummage well, and further d sufficient clear rain water to make up the whole quantity to exactly 100 gallons; again rummage well; add 2 oz. alum, dissolved in 1 quart of rain water, and a third time agitate for 15 minutes, after which put in the bung and let it stand for a fortnight, when it will be fit for sale.

Remarks. The above produces a beautiful article, provided the oil of peppermint be of good quality, the sugar double refined and stove-dried, and the cask one that will not give color. To ensure the *first*, the oil should be purchased of some known respectable dealer. That prepared at Mitcham, Surrey, and hence called "*Mitcham oil of peppermint*," is not only the strongest but best flavored, and though more than double the price of the foreign oil, is, in the long run, much the cheapest. *The sugar* should be sufficiently pure to dissolve in a wine glassful of clear soft water, without injuring its *transparency*, and the *cask* should be a fresh-emptied gin pipe, or one properly prepared for gin, as if it give color it will spoil the cordial. If these particulars be attended to, the product will be a *clear transparent* liquor as soon as made, and will not require fining; but should there be the slightest opacity, some alum may be added as above, which will clear it down. Some persons add more oil of peppermint, others less, than the quantity I have ordered, but this, as well as the weight of sugar, must depend upon the taste of the purchasers, and the price the liquor is to be sold at. The product is 100 gallons of cordial at 64 u. p., which is the strongest usually sent out. A similar plan may be followed for the manufacture of any other cordial liquor, the same principles and operations being common to all.

CORDIAL, SIR WALTER RALEIGH'S. *Syn.* SIR W. RALEIGH'S CONFECTION. AROMATIC DO. *Prep.* Fresh summits of rosemary and juniper berries, of each 1 lb.; cardamom seeds, zedoary, and saffron, of each ½ lb.; proof spirit 1½ gallons; digest for a fortnight, express and strain; evaporate to 2½ lbs. and add Gascoigne's powder 1 lb.; cinnamon and nutmegs, of each 2 oz.; cloves 1 oz., white sugar 2 lbs., mix well together.

Remarks. The above formula is that for the original aromatic confection. Sir Walter Raleigh's own receipt was far more complicated.

CORDIAL, SPORTSMAN'S. *Syn.* EAU DE CHASSEURS. *Prep.* Peppermint water and rectified spirits of wine, of each 1 pint; lump sugar ½ lb. Dissolve the sugar in the water and add it to the spirit.

CORDIAL, WARNER'S. *Prep.* Rhubarb ℥j; senna ʒiss; saffron ʒj; liquorice root ʒiv; raisins lb. j; rectified spirit lb. iij: digest for a fortnight. Laxative.

CORK. *Syn.* CORKER. The lichen omphalodes made into balls. Used to dye wool.

CORKS. The common practice of employing inferior corks for the purpose of stopping the mouths of bottles, is often productive of considerable loss, from the air being only partially excluded, and the contents suffering in consequence. I once saw a large "*bin*" of valuable wine become, in less than a year, little better than sour Cape, from the parsimony of its owner on this point, and I have frequently had to regret the loss of valuable chemical preparations from a similar cause. The best corks are those called "*velvet corks*," and of these the finest qualities are imported from France.

CORNS. Round, horny, cutaneous extuberances, with central nuclei, very sensitive at the base, arising from continued pressure over the projection of the bones, from *tight* or stiff shoes or boots. Corns are of two kinds, hard and soft. The former grow on the exposed portions of the joints, the latter between the toes.

Treat. First soak the feet in warm water for a few minutes, then pare the corns as close as possible with a sharp knife, taking care not to make them bleed. They may now be touched over with a little lunar caustic, or nitric acid. The former is used by merely rubbing it on the corns, previously *slightly moistened* with water; the latter by moistening them with it, by means of a strip of wood, or preferably a rod of glass. This treatment adopted every other day for 10 or 12 days, accompanied by the use of *soft, loose shoes*, will generally effect a cure. Concentrated acetic acid may be used instead of nitric acid, and is preferred by some persons from not staining the skin, but it is less active, and requires to be more frequently applied. It has been recommended to remove large corns by ligatures of silk, applied as close to the base as possible, and tightened daily until they drop off; but this plan is tedious, and is not always successful. Another mode of extirpation is the application of a small blister, which will frequently raise them with the skin out of their beds. In this case the exposed surface must be dressed with a little simple ointment. Soft corns may also be easily removed by applying ivy leaf previously soaked in strong vinegar, changing the piece every morning; or by placing a dressing of soap cerate, spread on a bit of lint or old rag, between the toes. One of the simplest and best remedies for hard corns, and which has lately received the sanction of high medical authority, is to wear upon the toe or part affected a small circular p of soft leather, or still better, a piece of ama spread with diachylon or other emollient pla and having a hole cut in its centre the size of corn. (Sir B. Brodie.) By this means the pres of the boot or shoe is equalized, and the corn p tected.

Prevention. This consists in keeping the clean, by frequent ablutions with warm water, the use of *easy, soft shoes or boots*. Without latter precaution, corns will generally return, e after they appear to have been perfectly remo

CORNS, POPULAR REMEDIES FOR. (*Lotion.*) Sal ammoniac 1 oz., spirit 4 oz.; diss Moisten the corn with this lotion every mor and evening.

II. (*Powder.*) Savine leaves 2 oz.; verdig oz.; red precipitate ½ oz.; all in powder. Mix. plied by means of a piece of rag to the corn nigh

III. (*Plaster.*) White diachylon and yel rosin, of each 2 oz.; melt and add finely-powd verdigris 1 oz. For use, spread it on paper, li or leather, and apply a small piece to the corn.

CORN SOLVENT, SIR H. DAVY'S. P Potash 2 parts, salt sorrel 1 part; each in powder. Mix and lay a small quantity on corn for four or five successive nights, binding i with a rag.

CORRECTING PROOFS. (In Typograp The operation of marking on the proof sheets o work any errors of orthography, punctuation, rangement, or language, they may contain, a also any alterations that may appear necess The following specimen will explain the met generally adopted for this purpose, and with a li attention will enable any person to superintend work through the press, as far, at least, as pends upon the correction of the proofs:

[Proof.]

As the vine, which has long
twined its grac~~e~~ful foliage
about the oak / and been
lifted by it into sunshine, will
when the hardy plant is rift
ed by the thunder bolt,
cling round it with its
caressing tendrils, and bind
its shattered boughs up
so is it ordered beautifully
by providence, that woman,
who is the mere depend~~ent~~
and ornament of man in ~~the~~
happier hours, should his
stay and solace.

When smitten by
sudden calamity winding
herself into the rugged
recesses of his nature, ten-
derly supporting the droop-
ing ~~head~~, and binding up
the broken heart. [It also
is interesting to notice how
some MINDS seem almost to
create themselves, springing
up under , and working their
solitary but irresistible way,
through a thousand obsta-
cles Nature seems, &c.

IRWING.

29 every disadvantage

The same corrected:

As the *vine*, which has long twined its graceful foliage about the oak, and been lifted by it into sunshine, will, when the hardy plant is rifted by the thunderbolt, cling round it with its caressing tendrils, and bind up its shattered boughs, so is it beautifully ordered by Providence, that WOMAN, who is the mere dependant and ornament of man in his happier hours, should be his stay and solace when smitten by sudden calamity; winding herself into the rugged recesses of his nature, tenderly supporting the drooping head, and binding up the broken heart.

It also is interesting to notice how *some* minds seem almost to create THEMSELVES, springing up under every disadvantage, and working their "solitary but irresistible way," through a thousand obstacles. Nature seems, &c

IRVING.

Explanation of the marks.

1. When a letter or word is to be in *italics*.
2. When a letter is turned upside down.
3. The substitution of a comma for another point or letter.
4. The insertion of a hyphen; also marked -/
5. When letters should be close together.
6. When a letter or word is to be omitted.
7. When a word is to be changed to Roman.
8, 9. Two methods of marking a transposition; when there are *several* words to be transposed, and they are much intermixed, it is a common plan to number them, and to put the usual mark in the margin.
10. Substitution of a capital for a small letter.
11. When a word is to be changed from small letters to capitals.
12. The transposition of letters in a word.
13. The substitution of one word for another.
14. When a word or letter is to be inserted.
15. When a paragraph occurs improperly.
16. The insertion of a semicolon.
17. When a space or quadrat stands up, and is seen along with the type.
18. When letters of a wrong fount are used.
19. When words crossed off are to remain.
20. The mark for a paragraph, when its commencement has been neglected. Sometimes the sign [, or ¶, or the word "*break*," is used, instead of the syllables "*New Par.*"
21. For the insertion of a space when omitted.
22. To change capitals to small letters.
23. To change small letters to small capitals.
24. When lines or words are not straight.
25, 26. The insertion of inverted commas. The apostrophe is similarly marked.
27. The insertion of a period when omitted, or in place of another point or letter.
28. Substitution of one letter for another.
29. The method of marking an omission or insertion when too long for the side margin.

cient to permit of the body floating with the mouth and nostrils free for respiration, provided the face be turned upwards, or the head thrown back, so that the greater portion of the latter may be immersed, and its weight sustained by the water. It is also a well known fact, that if a person throw himself into the water, the body will rapidly rise to the surface and assume nearly the erect position, and that the upper part of the head, down to a little below the eyes, will remain above the surface. This position is occasioned by the greater density of the legs and thighs compared to that of the chest, which acts as a species of float or buoy to the rest of the body. In this situation, however, it would of course be found impossible to breathe, but if the head be thrown back, so that the face may become the exposed portion, as before mentioned, respiration may be carried on without inconvenience.

The truth of the above I have frequently demonstrated in practice; I found that at each *inspiration* a larger portion of the face became exposed, and at each *expiration*, the water rose very nearly to the corners of the mouth, but still not sufficiently high to run into it, unless a forced and hurried respiration was purposely had recourse to. Thus a continual rising and sinking of the body takes place, and these motions are synchronous with the inflations and contractions of the lungs. When a hand and part of the forearm is raised above the water, the face becomes instantly immersed. From the above it appears evident, that if a person fall into the water, and exercise but common presence of mind, he may readily float for some time, or until assistance can reach him, even though he be not able to swim. Unfortunately, however, the state of alarm and agitation into which persons are thrown on falling into the water, and their ignorance of the general means which should be resorted to in such an emergency, as well as want of presence of mind, lead them to neglect those obvious measures that are essential to their preservation. Persons suddenly submerged in the water should endeavor to preserve themselves as collected as possible, and should avoid splashing and throwing themselves about, as this will naturally increase the danger. They should allow the body to assume its natural position, and if they cannot swim, should patiently wait until assistance be afforded them. Another point which should be remembered by every person under such circumstances is, that there is always a considerable amount of residual air in the lungs in a nearly deoxidized state, and that if this be expelled by two or three forced inspirations, and a deep inspiration be then taken, a larger quantity of vital air will be introduced to the lungs, and the blood will continue aërated for a proportionally longer time, and consequently a longer period will elapse before another inspiration will be required. It will be found, that if, in the ordinary course of breathing, we suddenly hold our breath, we shall only be able to do so for a space of time varying from 20 to 30 seconds; but if, on the contrary, we prepare ourselves by taking two or three forced inspirations, and then take a full inspiration, we may remain for 1½ or 2 minutes before a second attempt at respiration need be made. This is the plan adopted by the pearl fishers, and other divers who are remarkable for remaining beneath the surface of the water for some time. A person in danger of shipwreck, or expecting immediate submersion in any other situation, should have recourse to this method, as it would permit the breath to be held until the body rises to the surface of the water, and would prevent the dreadful effects of attempting respiration while the mouth is covered with that fluid.

The writer of this article nearly lost his life a few years since, from not exercising the precautions which he is now recommending to others. He had been swimming for about a quarter of an hour, as was his daily custom at the period alluded to, and was returning to the bank, when a species of paralysis seized both extremities, and instead of preserving his presence of mind, and patiently waiting until the fit went off, he exhausted himself in fruitless endeavors to reach the land. The result was, that after a few vain struggles he sunk, and vividly present to his mind, even at this moment, are the feelings he then experienced. The recollection of a comrade that was drowned a few days before, near the same spot, and the conviction of inevitable death, passed across his mind like an electric shock,—life, death, and eternity—the dread of leaving his friends in ignorance of his fate, and a thousand other subjects, were idealized in a moment, and were followed by others in incessant and rapid succession. Space and time seemed annihilated.—they presented no visible horizon to the mind's eye,—all was present,—all the events of life seemed collected and performing at the same moment—as in a day-dream, where individual distinctness is blended with general confusion. A pleasing state of mental serenity ensued; the prospect gradually changed, and surrounding space seemed covered with verdure of the softest green, and illuminated with green light of the most subdued tone, which gradually faded into twilight, and—here consciousness ceased. During the whole of this time, which occupied about 3½ minutes, no great bodily suffering was experienced; after the first sensations of suffocation were passed, none at all are recollected to have been felt. Many years have now passed over since the occurrence of the accident above alluded to, but though time has erased from the memory of the writer many events of more recent date, and with a busy hand has scattered trials and afflictions in his path, yet the incidents that occurred on the morning of ——, still occasionally start up before the mind, as distinctly as the doings of yesterday.

Treatment of persons apparently drowned. The first object is the restoration of the animal heat. For this purpose, the wet clothes are to be removed without delay, and the body, after being well dried, is to be surrounded with warm air. The heat should at first be moderate, and gently increased. In the absence of a warm-air bath, the body should be laid in a well-heated bed or blankets, and bottles of hot water laid to the feet and armpits. A warming-pan or heated bricks should be passed over the body, or gentle friction exercised with other warm substances. Meanwhile, continual though gentle attempts should be made to excite respiration artificially; and, if the apparatus be at hand, slight shocks of electricity should be kept up at the same time. If there be

regular course, but it is often productive of most serious consequences, by superinducing the inflammation of some organ, or laying the foundation of phthisis.

Cough is sometimes attended by copious expectoration, and at other times exists without any; it has hence been distinguished into *moist* or *mucous* cough, and *dry* cough.

Treat. The treatment of common catarrhal cough consists in allaying the irritation as much as possible, by demulcents and expectorants, as mucilaginous drinks and lozenges, which act upon the glottis, and sympathetically upon the trachea and bronchiæ. Among the first may be mentioned, almond milk, barley water, refined Spanish juice, gum arabic, and a mixture of the last two made into lozenges; among the second, the most innocent and convenient is ipecacuanha, in the shape of lozenges, 2 or 3 of which may be sucked whenever the cough is troublesome. A light diet should be adopted, the bowels kept *slightly* relaxed by mild aperients, and a mild and equable temperature sought as much as possible. When this plan does not succeed, recourse may be had to an emetic, followed by small doses of Dover's powders, and extract or tincture of henbane, or squill pill. When a cough is troublesome at night, and unattended with fever, a small dose of laudanum, or tincture of henbane, taken on going to rest, will generally procure sleep. In the treatment of dry cough the more stimulating expectorants are useful, as garlic, ammoniacum, styrac, and benzoin, combined with narcotics and sedatives, as henbane, hemlock, and opium. A diaphoretic opiate is also very useful, especially in the cough of old people.

COUGH, POPULAR REMEDIES FOR. I. (*Draughts.*) *a.* Sirup of poppies 1 dessert-spoonful; antimonial wine 20 drops; mix for a dose, to be taken in a little warm tea on going to bed. *b.* Laudanum 30 drops; vinegar and honey, of each, a dessert-spoonful; ipecacuanha wine 25 drops; mix for one dose, as last.

II. (*Emulsion.*) Milk of almonds 4 oz.; sirup of squills and tolu, of each, 1 oz.; mix. *Dose.* A tablespoonful every 2 hours.

III. (*Mixtures.*) *a.* Tincture of tolu ½ oz.; paregoric elixir and tincture of squills, of each, ½ oz.; sirup of white poppies 1 oz.; mix. *Dose.* 1 teaspoonful in barley water, whenever the cough is troublesome. *b.* Milk of ammoniacum 4 oz.; sirup of squills 2 oz.; mix. A tablespoonful 3 or 4 times daily, for the cough of old persons. *c.* (*Dr. Munro's.*) Paregoric ½ oz.; sulphuric ether and tincture of tolu, of each, ¼ oz.; mix. *Dose.* A teaspoonful night and morning, or when the cough is troublesome, in a little warm water. *d.* (*Dr. Radcliff's.*) Sirup of poppies, sirup of squills, and paregoric, of each, ½ oz.; mix. *Dose.* As last.

COUMARINE. The fragrant volatile principle of the tonka bean, the diptera odorata of Willdenow. It is dissolved out by ether, and purified by alcohol. It crystalizes in small prisms.

COWHAGE. *Syn.* Cowitch. Dolichis pubes. The down which grows upon the pods of the mucuna pruriens. (Dolichos pruriens.) It occasions violent itching, when it comes in contact with the skin, which can only be allayed by a solution of given vitriol or oil. It is frequently administered as a vermifuge, made into a confection, by scraping the hair off a pod into treacle, sirup, or honey, for a morning dose, which is repeated for 3 or 4 successive days, followed by a brisk purge.

COWS, MILCH, (CHOICE OF.) As to a choice of breeds for a private family, none in England, (says Mr. Lawrence,) probably combine so many advantages as the Suffolk dun-cows. They excel both in quantity and quality of milk; they feed well after they become barren; they are small-sized, and polled or hornless; the last a great convenience. The horns of cows which butt and gore others, should be immediately broad tipped. There is a breed of polled Yorkshire, or Holderness cows, some of them of middling size, great milkers, and well adapted to the use of families, where a great quantity of milk is required, and where price is no object, and food in plenty. If richer milk and a comparison of the two famous breeds be desired, one of each may be selected, namely, the last mentioned, and the other of the midland county, or long-horned species. Color is so far no object, that neither a good cow nor a good horse can be of a bad color; nevertheless, in an ornamental view, the sheeted and pied stock of the Yorkshire shorthorns make a picturesque figure in the grounds.

The Alderney cows yield rich milk upon less food than larger stock, but are seldom large milkers, and are particularly scanty of produce in the winter season. They are, besides, worth little or nothing as barreners, not only on account of their small size, but their inaptitude to take on fat, and the ordinary quality of their beef.

Feeding. There is nothing equal to rich pasturage for milch cows, but at such seasons, and during such weather that this cannot be procured, good hay, with turnips, carrots, potatoes, or mangel-wurzel, must be given instead, along with a sufficient quantity of clean water. The principal cowkeepers of the metropolis have dairy-farms in the suburbs, where the animals are turned out a portion of every day in the year, except during heavy rains, or when the ground is covered with snow. They are also well supplied with brewers' grains, tares, beet-root, &c., and great care is taken that they get fresh air, and exercise sufficient for their health. Such cows yield a large quantity of wholesome milk, very different to much that is sold in London, obtained from cows kept in stables, cellars, and other confined situations, and which are seldom supplied with green food. It has lately been shown by Boussingault, that mangel-wurzel, so commonly used for feeding cattle, is insufficient as an article of food. He found that a cow fed on this substance ceases to give her usual quantity of milk, and that even when other food was given along with it, the animal yielded less than her ordinary quantity. Before giving turnips to cows, the rotten or bad ones should be picked out, as it is said that even the presence of a single damaged one will flavor the milk, and perhaps spoil a whole dairy of cheese or butter.

Economy of a cow. The annual consumption of food per cow, if turned to grass, is from an acre to an acre and a half in the summer, and from a ton to a ton and a half of hay in the winter. A cow may be allowed 2 pecks of carrots

per day. The grass being cut and carried, will economize it full ⅓. The annual product of a good fair dairy cow, during seven months after calving, and either in summer or winter, if duly fed and kept in during the latter season, will be an average of 7 lbs. of butter per week, from 3 to 5 gallons of milk per day. Afterwards, a weekly average of 3 or 4 lbs. of butter from barely half the quantity of milk. It depends on the constitution of the cow, and how nearly she may be milked to the time of her calving, some giving good milk until within a week or two of that period, others requiring to be dried 8 or 9 weeks previously. I have heard (says Mr. Lawrence) of 20 lbs. of butter, and even 22 lbs., made from the milk of 1 long-horned cow in 7 days; but I have never been fortunate enough to obtain one that would produce more than 12 lbs. per week, although I have had a Yorkshire cow which milked 7 gallons per day, yet never made 5 lbs. of butter in one week. On the average, 3 gallons of good milk will make 1 lb. of butter.

CRACKNELS. *Prep.* Mix a pint of flour with a little grated nutmeg, the yelks of 2 eggs, 2 or 3 spoonfuls of rose-water, and cold water sufficient to make a paste; then roll in ¼ lb. of butter, and make it into shapes. In 1 hour put them into a kettle of boiling water, and boil them until they swim, then throw them into *cold* water; take them out, and when dry bake them on tins.

CRACKNUTS. *Prep.* Flour 1 lb.; sugar ¾ lb.; melted butter ½ lb.; 6 or 7 eggs, well beaten; make a paste with a glassful of raisin wine and a little water; add caraways, roll it out as thin as paper, cut it into shapes with a tumbler, wash the pieces with the white of egg, and dust them over with powdered sugar.

CRAMP. Spasmodic or involuntary contractions of the muscles, generally of the extremities, accompanied with great pain. The muscles of the legs and feet are those most commonly affected with cramp, especially after great exertion. The best treatment is immediately to stand upright, and to well rub the part with the hand. The application of strong stimulants, as spirits of ammonia, or of anodynes, as opiate liniments, has been recommended. When cramp occurs in the stomach, a teaspoonful of sal volatile in water, or a dram glassful of good brandy, should be swallowed immediately. When cramp comes on during cold bathing, the limb should be thrown out as suddenly and violently as possible, which will generally remove it, care being also taken not to become flurried nor frightened; as presence of mind is very essential to personal safety on such an occasion. A common cause of cramp is indigestion, and the use of acescent liquors; these should be avoided, and bitters and absorbents had recourse to.

CRAYONS. Small cylinders or pencils of coloring substances, used for drawing upon paper, &c.

Prep. Crayons are commonly prepared by mixing up the color with some substance that will dilute it to a proper shade, and give it the necessary softness and tenacity to adhere readily to paper, when rubbed against it. The cylindrical form is generally given to them by means of a cylinder of 2 or 3 inches diameter, having one end open, and the other firmly secured to a perforated plate, having holes of the same size as the intended crayons. The crayon-composition, in the state of a stiff paste, is introduced into the open end, and is driven down and through the holes, by means of a small plug or piston, that exactly fits the inside of the cylinder. To impart an equable motion, which is essential to the formation of well-shaped crayons, a small screw is employed. The pieces that pass through the holes are cut into lengths and dried. All the materials employed in making crayons are previously reduced to the state of an impalpable powder, and those that are gritty are elutriated or washed over. The following are among the best formulæ for making crayons:

I. Spermaceti 3 oz.; boiling water 1 pint; agitate together till they form a species of emulsion, with which mix up bone ashes 1 lb., (previously reduced to an impalpable powder,) and coloring matter as much as is required to give the proper tint. When half dry form the mass into crayons.

II. Pipeclay, and the finest prepared chalk, equal parts; or pipeclay alone, q. s.; coloring a sufficient quantity. Make them into a paste with pale mild ale.

III. (*Process of the brothers Joel, of Paris.*) Shellac 3 parts; spirits of wine 2 parts; oil of turpentine 1 part; coloring matter and blue clay, of each 6 parts. The shellac is dissolved in the spirit, and well mixed by trituration with the clay, (previously elutriated and dried,) the colored powder, and the turpentine; the mass is then made into crayons, which are dried by a stove heat.

IV. White curd or Castile soap, cut into thin shavings, 1 oz.; boiling water 1 pint; dissolve, and when cold add gradually as much rectified spirit of wine as will barely render the liquid transparent. With this fluid make the coloring matter into a paste, along with ½ its weight each of the finest elutriated clay and chalk.

V. Shellac 5 parts; wood naphtha 10 parts; dissolve, and with this fluid mix up the coloring powder, previously stirred up with an equal weight of fine blue clay. Dry the crayons by a stove heat. If this process be well managed, it will produce crayons equal to those of the best Parisian houses.

VI. (*Colored crayons.*) Crayons may be made of any color or shade, by employing suitable pigments, and diluting them with a proper quantity of elutriated or prepared chalk. *White crayons* are made of this substance, by simply combining it with a suitable quantity of pure clay, or by mixing it up in either of the ways just described. *Black crayons* are made of prepared blacklead, ivory-black, lamp-black, &c. Black chalk is frequently made into crayons by simply sawing it into suitably-sized pieces. *Red crayons* have, as their coloring ingredients, carmine, carminated lakes, vermilion, and any of the earthy or mineral colors commonly used as pigments. General Lomet has proposed, as a superior red crayon, the softest hematite, elutriated, dried, and made into a paste with water holding in solution a little gum and soap. *Blue crayons* are made of indigo, smalts, Prussian blue, verditer, &c. *Green crayons* of a mixture of king's yellow, or yellow ochre, with blues. *Yellow crayons* of king's yellow, Naples ditto, yellow ochre, &c. *Brown crayons* of umber, (raw and burnt,) terra di sienna, (raw and

burnt,) Cullen's earth, brown ochre, &c.; and some peculiar shades, of a mixture of black, carmine, and either of the above colors. *Purple crayons* are made with any of the more brilliant blues, mixed with carmine, lake, or vermilion.

Remarks. As crayon colors do not admit of being mixed together at the time of using them, like liquid colors, it is usual to make 3 to 6 different shades of each color, so as to enable the artist at once to produce any effect he chooses.

CRAYONS, LITHOGRAPHIC. *Prep.* I. Tallow soap 7 parts; white wax 6 parts; melt by a gentle heat, add lamp-black 1 part, and cast it into moulds.

II. White wax 4 parts; shellac and hard tallow soap, of each 2 parts; lamp-black 1 part; as last.

III. Spermaceti, white wax, and hard tallow soap, of each equal parts; lamp-black to color; as last.

Use. To draw designs on lithographic stones.

CREAM. The oleaginous portion of milk, which collects in a thin stratum upon the surface, when that fluid is left undisturbed for some time. By the process of churning, it is converted into butter. When kept for some days, it becomes thicker, and partially coagulated, in consequence of the formation of some lactic acid, which precipitates the caseous matter contained in the small portion of the milk with which the cream is mixed. If cream in this state be violently shaken, as in the operation of churning, the oily portion, or butter, quickly separates, and leaves a liquid behind, called *buttermilk.* If instead of churning it, we suspend it in a linen bag, and allow it to drain, it will gradually become drier and harder by the separation of the liquid portion, and will then form what is known by the name of cream cheese. By the application of *slight* pressure, the separation of the whey is more completely effected, and the product is not only better, but will keep longer. When cream is intended for churning, it should be kept until it turns *slightly* sour, as then the butter will readily "*come;*" for if churned while quite sweet, the operation will be tedious, and frequently fail. When this happens, the dairy maids declare the milk is "*charmed,*" or "*bewitched,*" and reluctantly proceed with the operation. The cause of this is the want of acidity, which is not the case when the cream has been kept for a certain time before churning, for then a portion of the sugar contained in the serum is converted into lactic acid. The addition of a little rennet, or vinegar, is the proper remedy in this case, and will cause the almost immediate appearance of the butter.

The term "*Cream*" is also frequently applied to some compound spirits and cordial liquors, because of their cream-like smoothness and flavor.

Qual. The cream of milk may be regarded as an article of food in the same light as butter, as it is converted into the latter by the process of digestion, especially when violent exercise follows after eating it. On this account much cream should never be taken at once by persons of delicate stomachs. In eating cream with fruit, persons are hardly aware of the large quantity they consume, until they find it disagree with their stomachs, when the condiment is blamed for the indiscretion of those who take it

CREAM, ALMOND. *Prep.* Sweet almonds 2 oz.; bitter almonds 4 in number; blanch and beat them in a mortar to a *smooth paste,* adding a teaspoonful of water to prevent oiling. Mix this with a pint of cream, the juice of a lemon, and enough powdered lump sugar to sweeten; whisk up a froth, take it off and lay it on a clean sieve; then fill glasses with the liquor, and place some of the froth on the top of each.

CREAM, BRANDY. *Prep.* Mix a teacupful of almond cream with ½ a pint of milk; boil for 2 minutes, and when cold, add the yelks of 6 eggs and a quart of cream; heat it gently over the fire until it thickens, keeping it well stirred; then add 2 or 3 glasses of brandy, and pour it into small cups or shallow glasses.

CREAM, BURNT. *Prep.* Cream 1 quart; cassia a small stick; the peel of half a lemon; boil for 5 minutes; let it cool a little and take out the spice; then add the yelks of 9 eggs, and sugar to sweeten; stir until cold, put it into a dish, strew powdered sugar over it, and bake it until brown.

CREAM, COLD. *Syn.* GALEN'S CERATE. CERATUM GALENI. *Prep.* I. Oil of almonds 1 lb.; white wax ¼ lb.; melt together in a water-bath, strain, if necessary, and add by degrees rose water (made warm) ¾ pint; stir assiduously until cold.

II. Olive oil and rose water, of each 1 pint; spermaceti and white wax, of each 4 oz.; as last.

III. White lard 1 lb.; spermaceti ¼ lb.; orange flower water ½ pint; as last.

Remarks. The above may be further scented by the addition of any fragrant essence or oil, if desired. It is used as a mild unguent to soften the skin, prevent chaps, &c.

CREAM, COLD, (HUDSON'S.) *Prep.* Oil of almonds 4 oz.; white wax and spermaceti, of each ¼ oz.; rose water 4 oz.; orange flower water 1 oz.; as last.

CREAM, COSTOPHIN. Named after a village near Edinburgh, where it is commonly made. *Prep.* Put the milk of 3 or 4 consecutive days, together with the cream, into a vessel, and allow it to remain until sour and coagulated. The whey must be now drawn off, and fresh cream added. It is eaten with sugar and fruit, especially strawberries and raspberries.

CREAM, DEVONSHIRE RAW. Sour cream mixed with an equal quantity of fresh cream, and sweetened with sugar. Eaten with fruit.

CREAM, DEVONSHIRE SCALDED. *Syn.* CLOUTED CREAM. *Prep.* Set the milk of yesterday in a polished shallow brass pan, over a charcoal or other clear fire, free from smoke, and gradually heat it very hot, but be careful not to let it boil. It is readily known to be done enough when the undulations on the surface look thick, and form a ring round the top of the fluid, the size of the bottom of the pan. Let it cool, and the next day skim off the cream. It is eaten with sugar and fruit, and is made into butter.

CREAM, D'ILLOTTE'S VEGETABLE. *Syn.* CRYSTALLIZED CREAM. *Prep.* Oil of almonds 2 oz.; spermaceti ¼ oz.; melt and add bergamotte, neroli, and verbena, of each 5 drops; huile au jasmin 10 drops. Stir well together, and pour it into small wide-mouthed bottles to crystal-

should be avoided, and recourse should frequently be had to society, and amusements of a lively and interesting character. If the bowels are confined, mild aperients should be taken, and if diarrhœa be present, antacids and absorbents may be had recourse to with advantage. The stomach should be strengthened by the use of mild bitters, tonics, and stimulants, and sea-bathing, or the tepid bath may be taken when convenient. Where dyspepsia is a secondary or symptomatic disease, the cause should be sought into, and the treatment varied accordingly. Among the aperient medicines most suitable to dyspepsia, may be mentioned—Epsom salts, phosphate of soda, and Seidlitz powders, either of which should be taken largely diluted with water. An occasional dose of the Abernethy Medicines, noticed on our first page, has also been recommended. Among antacids, are the bicarbonates and carbonates of potassa and soda, either of which may be taken in doses of half a teaspoonful dissolved in water, or if the spirits be low, one or two teaspoonfuls of spirits of sal volatile will be more appropriate, and in cases accompanied by diarrhœa, a little prepared chalk. As *bitters*, compound infusion of orange-peel, or gentian, is excellent. As *tonics*, small doses of *bark*, or disulphate of quinine, to which chalybeates may be added, if there be no disposition to fever or headache.

EARTHS. *Syn.* Terræ, (*Lat.*) Terres, (*Fr.*) Erden, (*Ger.*) In Agriculture: soils wholly or nearly destitute of organic matter. In Chemistry: certain metallic oxides that constitute the principal portion of the various stony and pulverent masses that form our mountains, valleys, and plains, and the whole crust of the globe we inhabit, as far as the researches of man have penetrated. The primitive earths are nine in number, viz. *baryta*, *strontia*, *lime*, *magnesia*, *alumina*, *glucina*, *zirconia*, *yttria*, and *thorina*. The first four have been denominated *alkaline earths*, from their partial solubility in water, their alkaline taste, and their action on vegetable colors; the remainder have been called *earths proper*, from their insolubility in water, and their imperfect neutralization of the acids. *Silica* and *lithia* have also been classed with the earths, but the former is more correctly placed among the acids, from its power of neutralizing bases, and the latter with the alkalis, from its behavior with the acids, and the solubility of its carbonate in water. All the above earths were regarded as elementary substances, until Sir H. Davy, in 1808, proved them to be metallic oxides. In a state of purity they are white and *incombustible*, but they exist in nature in combination with other substances, mostly acids and oxides of the common metals, which alter their appearance. *Baryta* is the mineral constituent of rat's stone and heavy spar; *Lime*, combined with carbonic acid, forms chalk, marble, and the shells of fish, and with phosphoric acid, the earthy portion of the bones of animals; *alumina* constitutes clay, in which state it is usually combined with oxide of iron and carbonate of lime; the other earths play a less important part in the economy of the globe. The metals of which the earths are the oxides, are obtained with difficulty, and possess but an evanescent existence. (See Barium, Aluminium, &c.)

EATON'S STYPTIC. A spirituous solution of sulphate of iron, disguised by the addition of some other ingredients.

EAU. (*Fr.*) Water. *Eau douce*, fresh or river water. *Eau de mer*, sea or salt water. *Eau de fontaine*, spring water. *Eau de source*, do. *Eau de puits*, well water. *Eau de rivière*, river water. *Eau de rose*, *eau rose*, rose water. *Eau de vie*, brandy. *Eau d'Hongrie*, Hungary water. *Eau bénite*, holy water. *Eau forte*, aquafortis.

The word *eau* is applied to numerous substances, differing in their composition, sensible properties, and uses, as will be seen above. In perfumery, it is generally used to designate solutions of the fragrant essential oils in spirit, as *eau de Cologne*, *eau de bouquet*, &c., or to distilled waters, largely charged with the odorous principles of plants, as *eau de rose*, *eau de fleurs d'oranges*, &c. In the *art of the liqueuriste*, it is frequently applied to aromatized spirits, or cordial liqueurs. (See Water.)

EAU D'ANGE DISTILLEE. *Prep.* Benzoin 4 oz.; storax 2 oz.; cloves ½ oz.; calamus and cinnamon, of each ¼ oz.; coriander seeds 1 dr.; all bruised; water 5 pints; draw off 2 quarts. Fragrant.

EAU D'ANGE DISTILLEE ET MUSQUEE. *Prep.* Benzoin 4 oz.; storax 2 oz.; cinnamon ½ oz.; cloves and calamus ¼ oz.; 2 fresh emptied musk bags; water 3 pints; digest in a gentle heat for 2 hours, then draw over 1 quart. Fragrant.

EAU D'ANGE BOUILLEE. *Prep.* Rose water and orange-flower water, of each 3 pints; benzoin 1 lb.; storax ½ lb.; cinnamon 1 oz.; cloves ½ oz.; 3 fresh emptied musk bags; digest in a securely-covered vessel at nearly the boiling heat for 2 hours, then allow it to cool; strain off the clear, and press the remainder; lastly filter for use. Fragrant.

EAU D'ANSERINE. Distilled from the herb, 2 lbs. to water 5 quarts, drawing off only 1 gallon. It is scentless and tasteless. Used by the French in dressing gauzes.

EAU D'ARQUEBUSADE. *Syn.* Vulnerary Water. Aqua Vulneraria. Aq. Vul. Spirituosa. Aq. Sclopetaria. *Prep.* Dried tops of sage, wormwood, fennel, hyssop, marjoram, savory, thyme, rosemary, calamint, balm, peppermint, schordium, angelica leaves, (fresh,) bay leaves, and lavender flowers, of each 4 oz.; proof spirit 2 gallons; digest for 14 days, and distil over 1½ gallons.

II. Rosemary leaves 1½ lbs.; leaves of thyme and summits of millefoil, of each ½ lb.; proof spirit 2 gallons; distil over 5 quarts.

This water is stimulant and vulnerary, and is used as a cosmetic and cordial.

EAU DE BELLOSTE. *Prep.* Brandy 1 pint; muriatic acid ½ pint; hay saffron and sirup of saffron, of each 2 oz.; digest for 14 days and filter. Formerly used as a resolvent.

EAU DE BOUQUET. *Prep.* Rectified spirit of wine 1 quart; spirits of rosemary and essence of violets, of each 1 oz.: essences of bergamot and jasmine, of each 1 dr.; oils of verbena and lavender ½ dr.; eau de rose ½ pint; orange-flower

water 1 oz.; mix well and filter. An agreeable perfume.

EAU DE COLOGNE. *Syn.* COLOGNE WATER. AQUA COLONIENSIS. SPIRITUS DO. *Prep* I. (P. Cod.) Oils of bergamotte, lemons, and cedrat, of each ℥iij; oils of rosemary, lavender, and neroli, of each ℥iss; oil of cinnamon ʒvj; rectified spirit 8 gallons; spirits of rosemary 1 quart; compound spirit of balm (eau de melisse des carmes) 3 pints; digest for 8 days, then distil 3 gallons.

II. (Cadet Gassincourt.) Neroli, essences (oils) of cedrat, orange, lemon, bergamotte, and rosemary, of each 24 drops; lesser cardamom seeds ¼ oz.; spirit at 32° B. (0·869) 2 quarts; digest, then distil 1½ pint.

III. (Farina.) Rectified spirit 5 gallons; calamus aromaticus, sage, and thyme, of each ½ dr.; balm mint and spear mint, of each 1 oz.; angelica root 10 grs.; camphor 15 grains; petals of roses and violets, of each 3 drs.; lavender flowers 1½ dr.; orange flowers 1 dr.; wormwood, nutmeg, cloves, cassia lignea, and mace, of each 20 grs.; oranges and lemons, sliced, of each 2 in number; bruise or slice the solids, macerate with agitation for 48 hours, then distil off ⅔, and add to the product—essences of lemons, cedrat, balm mint, and lavender, of each 1 dr.; pure neroli and essence of the seeds of anthos, of each 20 drops; essences of jasmine and bergamotte, of each 1 oz.; mix well, and filter, if necessary.

IV. (Trommsdorff.) Oils of neroli, citron, bergamotte, orange, and rosemary, of each 12 drops; Malabar cardamoms, bruised, 1 dr.; rectified spirit of wine 1 quart; mix, and after standing 2 or 3 days distil.

V. Essence of bergamotte 40 drops; essence of lemons 45 drops; oil of rosemary 6 drops; oil of orange 22 drops; finest neroli 12 drops; essence of musk 1 drop; rectified spirit of wine 6 oz., (fluid;) mix. Excellent without distillation, if the oils be good.

VI. Rectified spirit of wine 1 pint; oils of bergamotte, orange, and rosemary, of each 1 dr.; cardamom seeds 1 dr.; orange-flower water 1 pint; mix, digest for a day, then distil.

VII. Neroli, essences of cedrat, orange, citron, bergamotte, and rosemary, of each ½ dr.; oil of verbena 20 drops; lesser cardamoms 1 dr.; rectified spirit of wine, at 32° B. ½ gallon; orange-flower water ½ pint; digest and distil 3 pints.

VIII. To the last add, before distillation, essences of musk and ambergris, of each 10 drops; powdered benzoin 15 grs; otto of roses 8 drops.

IX. Essence of bergamotte 3 oz.; essence of lemon 3 drs.; essence of cedrat 2 drs.; neroli 1½ dr.; oil of rosemary 1 dr.; spirit of wine 1½ gallon; rosemary tops 4 oz.; balm ½ dr.; distil.

Remarks. In the preparation of eau de Cologne, it is essential that the spirit be of the purest description, both *tasteless* and *scentless*, and that the oils be not only *genuine*, but *recently distilled*, as old oils are less odorous and contain a considerable quantity of resin and camphor, which would prove injurious. To produce an article of the *finest* quality, distillation should be had recourse to, as directed above; but a very excellent eau de Cologne may be produced by simple solution or maceration of the ingredients in the spirit, provided all the essences be new, pale-colored, and pure. When prepared in the latter way, any article that would impart a color should be avoided, as eau de Cologne should be both transparent and colorless. The mass of the eau de Cologne prepared in England, some of which possesses the most delicate fragrance, and is nearly equal to the best imported, is made *without* distillation. In the shops two kinds of this article are generally kept, viz., French and German. That prepared by Farina of Cologne is esteemed the best, and is preferred in the fashionable world.

Eau de Cologne is principally used as a perfume, but a very large quantity is consumed by fashionable ladies, as a cordial and stimulant to drive away the vapors. For this purpose it is dulcified with sugar. A piece of linen dipped in Cologne water, and laid across the forehead, is a fashionable remedy for headache.

EAU DIVINE. *Prep.* Essences of lemon and bergamotte, of each 1 dr.; dissolve in rectified spirit of wine 1 gallon; distil or filter; then add clarified sirup 3 quarts; distilled water 5 quarts; mix well and add orange-flower water 6 oz. A pleasant and fragrant cordial.

EAU DE FRAMBOISES. *Prep.* Strawberries, bruised, 16 lbs.; spirits of wine 1 gallon; distil to dryness in a salt-water or steam bath.

EAU DE HUSSON. *Syn.* EAU MEDICINALE. AQUA MEDICINALIS HUSSONII. This is a nostrum which was originally prepared by M. Husson, a French military-officer, and which has acquired great reputation for allaying the pain and removing the paroxysms of gout. It was submitted to a chemical investigation by Cadet and Parmentier, in 1782, but without eliciting further information than that it is a purely vegetable solution. Alyon has asserted that it is prepared with gratiola; Mr. Moore that it is an infusion of hellebore and laudanum; and Mr. Want that it is a vinous infusion of colchicum. The general opinion coincides with that of the latter gentleman, and the wine of colchicum is commonly substituted for it, and produces like effects. Dr. Collier has given the following form for the eau médicinale de Husson:—"Colchicum root, sliced, ℥ij; cherry wine f℥iv; macerate." This preparation is 2½ times as strong as the "vinum colchici" of the Pharmacopœia, and the dose should consequently be from 8 to 24 drops.

EAU DE LAVANDE. *Syn.* LAVENDER WATER. DOUBLE DISTILLED DO. *Prep.* I. Picked flowers 7 lbs.; rectified spirit 2 gallons; macerate for a week, then distil.

II. Flowers 7 lbs.; rectified spirit 1½ gallons; water ½ gallon; as before.

III. *Mitcham* oil of lavender 8 oz.; essence of bergamot 1½ oz.; essence of musk 4 oz.; rectified spirit 2 gallons; mix well. *Very fine.*

IV. To the last add 3 quarts of distilled water, and after well mixing, filter through blotting paper, with a few grains of magnesia.

Remarks. Both this and the preceding are better for distillation, and in that case, the musk should be added to the distilled spirit. The oils should be of the best quality, and newly distilled, and the spirit should be perfectly scentless.

Eau de Lavande is a most agreeable perfume. The article produced by the third form has been used by her majesty and many of the nobility.

EAU DE MARESCHALE. *Prep.* I. Musk

(grain) and ambergris, of each 20 grs.; oils of bergamot, lavender, and cloves, of each 1 oz.; oil of sassafras 10 drops; oil of origanum 20 drops; rectified spirit 2 quarts; macerate.

II. Rectified spirit 1 pint; essence of violets 1 oz.; essences of bergamot and œillets, of each ¼ oz.; orange-flower water ½ pint. As last.

EAU DE MELISSE DES CARMES. *Syn.* Eau des Carmes. Aqua Melissæ comp. Spiritus Melissæ co. *Prep.* (P. Cod.) Fresh balm flowers ℥xxiv; fresh lemon-peel ℥iv; cinnamon, cloves, and nutmegs, of each ℥ij; coriander seed and dried angelica root, of each ℥j; rectified spirit lb. viij; macerate for 8 days, and distil in a water-bath to dryness.

II. Take of spirit of balm 8 pints; lemon-peel 4 pints; nutmegs and coriander seeds, of each 2 pints; rosemary, marjoram, thyme, hyssop, cinnamon, sage, aniseed, cloves, angelica, (roots,) of each 1 pint. Mix, distil, and keep it for a year in an ice-house.

This is the original receipt of the barefooted Carmelites, now in the possession of the Company of Apothecaries of Paris, who sell a vast quantity of this celebrated water. It is much esteemed in France as a stomachic, a cosmetic, and a stimulant.

EAU DE MILLEFLEURS. *Prep.* I. Musk 10 grs.; essence of lemon 1½ oz.; essence of ambergris 2 oz.; oils of cloves, and lavender, (English,) of each 1 oz.; neroli and oil of verbena, of each 15 drops; rectified spirit 2 quarts. Macerate in a close vessel in a warm situation for a fortnight.

II. Rectified spirit 1 pint; essence of bergamot ½ oz.; eau lavande and essence of jasmine, of each 1 oz.; orange-flower water 8 oz.; mix.

III. Grain musk 15 grs.; essence of ambergris 1 drachm; eau d'ange 1 quart. As before.

EAU DE NAPHRE. *Syn.* Eau de Naphe. Aqua Naphæ. Double distilled Orange-flower Water. *Prep.* This article is distilled in Languedoc from the leaves of the bigarade or bitter orange-tree, but the preparation sold in England under this name, is commonly prepared as follows: orange-flowers 7 lbs.; yellow peel of the bigarade or Seville orange ½ lb.; white wine 5 quarts; spirits of wine 1 pint. Macerate in a warm place for three days, then distil.

EAU D'ŒILLET. *Prep.* Cloves, bruised, 1 lb.; water 5 quarts; macerate for 24 hours, then distil 1 gallon.

EAU DE RABEL. *Syn.* Aqua Rabelii. *Prep.* Strong oil of vitriol 1 part; alcohol 3 parts. Used as an astringent.

EAU D' HONGRIE. *Syn.* Eau de la Reine d'Hongrie. Aqua Hungarica. Hungary Water. *Prep.* I. Rosemary tops, in blossom, 4 lbs.; fresh sage ½ lb.; bruised ginger 2 oz.; rectified spirit 1½ gallon; water ½ gallon. Macerate for 10 days, then distil 11 pints.

II. Fresh rosemary flowers 2 lbs.; lavender flowers 2 oz.; rectified spirit 3 pints. Distil 3 lbs.

Hungary water is fragrant and stimulant, and is much esteemed by some persons as a cosmetic, and, sweetened with sugar, as a liqueur.

EAU SANS PAREILLE. *Prep.* I. Essence of bergamotte 5 drachms; essence of lemon 8 drachms; essence of citron 4 drachms; Hungary water 1 pint; rectified spirit 6 quarts. Macerate and distil.

II. Grain musk 20 grs.; ambergris 25 grs.; oils of lavender and cloves, of each 1 oz.; essence of bergamot ½ oz.; oils of sassafras and origanum, of each 20 drops; rectified spirit 1 gallon. Macerate for 14 days. A fragrant cosmetic.

EAU DE TAIN. *Prep.* Lemon thyme 1 lb.; water 5 quarts. Distil 1 gallon. Fragrant.

EAU DE VIE D'ANDAYE. *Prep.* Brandy or proof spirit 1 gallon; simple sirup 1 lb.; aniseed water ¾ pint; mix.

EBONY. Pale-colored woods are stained in imitation of ebony, by washing them with or steeping them in a strong decoction of logwood or galls, allowing them to dry and then washing them over with a solution of the sulphate or acetate of iron. When dry they are washed with clean water, and the process repeated if required. They are lastly polished or varnished.

EDULCORATE. *Syn.* Édulcorer, (*Fr.*) Aussüsen, (*Germ.*) From *edulco*, to make sweet. (In Chemistry.) The affusion of water on any substance for the purpose of removing the portion soluble in that fluid. Edulcoration is usually performed by agitating or triturating the article with water, and removing the latter after subsidence by decantation or filtration. It is the method commonly adopted to purify precipitates and other powders which are insoluble in water.

EGGS. *Syn.* Œufs, (*Fr.*) Ovum, an egg; Albumen Ovi, *white of egg;* Vitellus Ovi, *yelk of egg;* (*Lat.*) The eggs of birds are nutritious and easily digestible; and when lightly cooked by boiling, and eaten with a little salt, are admirably adapted as an aliment for the sick, and for persons with delicate stomachs. When boiled hard or fried, they are rendered less easily digestible, and have no advantage in this respect over good meat. A new-laid egg, broken into a cup of tea, coffee, or chocolate, and well beaten up, is an excellent ingredient in the breakfast of a person having a deficient appetite, and will be found very supporting. A glass of wine, beer, or porter, similarly treated, along with a biscuit, has been recommended as a light and nutritious luncheon or supper, well suited to the debilitated and the dyspeptic.

The average weight of a new-laid egg is about 3½ oz.; the white generally weighs 1¾ oz.; the yelk 1¼, and the shell and skin ½ oz.

Choice. The larger end of a new-laid egg feels cold, when placed against the tongue. New-laid eggs appear semi-transparent when placed between the eye and a strong light, and have a small and perceptible division of the skin from the shell, which is filled with air. When they shake they are stale. The eggs of the large black fowls called Minorcas or Spanish, and which have a very white and rough shell, are those that possess the most delicate flavor. The eggs of turkeys are much esteemed for some purposes; those of ducks and geese are coarse and inferior.

Pres. Eggs may be preserved for any length of time by excluding them from the air. One of the cleanest and easiest methods of doing this, is to pack them in clean dry salt, in barrels or tubs, and to place them in a cool and dry situation. I have eaten eggs thus preserved that were a twelvemonth old, and that had been some months aboard ship,

a tropical climate, and yet retained all the peculiar sweetness of new-laid eggs. With a like intention, eggs are placed in vessels containing milk of lime, or strong brine, or rubbed over with butter, lard, or gum-water; all of which act by excluding the air. Eggs may be preserved for some weeks in a cold situation, by placing them in a cabbage or potato-net, and hanging them to a nail, observing to hang them up by a fresh mesh of the net every day. Some persons place eggs which they wish to preserve in a netting, or on a sieve or colander, and immerse them for an *instant* in a caldron of boiling water, before packing them away. The practice of packing eggs in damp straw, or any thing else that can convey a flavor, should be avoided. The shells of eggs are porous, and readily admit the passage of gaseous substances and fetid odors. It is from inattention to this point that a large portion of the eggs imported from the coast of France have a less delicate flavor than those of our poultry yards. Damp chopped straw, as well as most other organic substances exposed to warmth and moisture, readily ferment, and during fermentation, a considerable increase of temperature takes place, as any one may readily perceive by examining the common hotbeds in our gardens; which are merely masses of organic matter in a state of decomposition. Eggs, as long as they retain the vital principle or embryo of the future chick, in a living state, (if I may be allowed the term,) possess in themselves a certain degree of warmth, which tends materially to promote the decomposition of the substance they are packed in, if moisture be present.

The importation of foreign eggs, during the year 1838, amounted to nearly 84,000,000, and the duty paid on them to upwards of £29,000. Since that time the number annually imported has, I believe, immensely increased.

EGGS AND BACON, ARTIFICIAL. "Make clear blancmange in a white dish, cut it into rounds with the top of a teacup, and lay them on the dish on which it is to be served; make yellow Dutch flummery, run it into a small teacup, in the form of the yelk of an egg, and place one on each round of the blancmange. Cut six straight pieces of blancmange, on which lay three streaks of preserved damsons, and serve all on the same dish."

EGG FLIP. Beer 1 pint; eggs 3 in no.; sugar 2 oz.; nutmeg and ginger sufficient. Break the eggs into one half of the beer, add the sugar, and beat well together; then place it in a clean "warmer," and heat it over the fire to nearly the boiling point, stirring it all the time, but do not let it boil; next add the other portion of the beer and the spices, and mix well together. Some persons add a glass of spirits. Care must be taken not to let it boil, as, if it does, the eggs will separate.

EGG WINE. Like the last, using equal parts of white wine and water instead of beer.

EGGS, GLAIRE OF. *Prep.* Separate the whites from the yelks, and whisk them to a froth, let them stand 24 hours, and strain them through muslin. Used as a glaze or varnish.

EGGS IN SALADS, &c. (SUBSTITUTE.) *Prep.* Cream 1 tablespoonful; unflavored calves' feet jelly 2 do.; a piece of salt the size of a bean; hot water, stained yellow with turmeric, 1 dessertspoonful; mix well.

ELAIDIC ACID. An acid compound formed by the action of nitrous acid or nitrate of mercury on oleic acid.

Prep. Pass a current of nitrous gas through pure oleic acid, at a low temperature, for 5 minutes; wash the crystalline mass, that shortly afterwards forms, with hot water; and then dissolve it in an equal volume of hot alcohol. On cooling, crystals will form, and must be purified by pressure, re-solution, and crystallization. (Meyer.)

Prop., &c. Elaidic acid, prepared as above, resembles sublimed benzoic acid; melts at 113° Fahr., and is soluble in alcohol and ether; with the alkalis and their carbonates it forms hydrated salts, which yield strong soapy solutions.

ELAIDIN. A compound of elaidic acid and glycerine, formed by the action of nitrate of mercury on olive oil. It is one of the components of citrine ointment.

ELATERINE. *Syn.* MOMORDICINE. The active principle of elaterium. It was discovered by Dr. Clutterbuck in 1819, but first obtained in a state of purity in 1830, by the late Mr. Hennel.

Prep. I. Digest elaterium in hot alcohol, evaporate the tincture to the consistence of thin oil, then throw it into boiling distilled water, and allow the whole to cool; collect the precipitate, and purify by re-solution in alcohol and precipitation by water as before. (Dr. Morries.)

II. Digest the alcoholic extract of elaterium in ether, and dissolve the residuum in hot alcohol; crystals will form as the solution cools. (Hennel.)

Remarks. Elaterine forms delicate silky crystals, having a bitter taste. It is a drastic purgative. *Dose.* One-sixteenth gr.

ELATERIUM. (*From ἐλαύνω, I stimulate or urge forward.*) The term ἐλατήριον was applied by the Greeks to any drastic purgative, but principally to the juice of the wild or squirting cucumber. The word elaterium, according to present usage, means the deposite obtained from the juice of the wild cucumber.

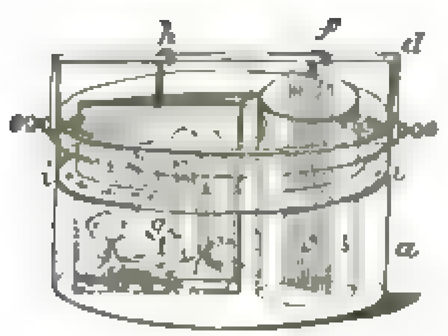
Prep. I. (Dr. Clutterbuck.) Gather the cucumbers when as ripe as possible, but without violence that might endanger their bursting. Then wet them by the affusion of cold water, cut them through longitudinally, and allow the juice to strain through a fine sieve into an earthenware vessel. Scoop out the seeds and surrounding pulp, place them on the sieve, and wash them repeatedly with cold water. The same process may afterwards be applied to the split cucumbers. The several waters being received in the same vessel with the juice, the whole is to be allowed to repose for a few hours, when the clear portion must be decanted and the sediment spread thinly on fine linen and exposed to the air to dry. Exposure to sunshine or a bright light should be avoided, but gentle warmth may be employed without injury. Quality very fine, but the product *small.* Forty fruits yielded Dr. Clutterbuck only 6 grains of elaterium.

II. (*Process followed at Apothecaries' Hall.*) The fruit cut longitudinally into halves, is placed in hempen or horse-hair bags, and submitted to slight pressure in a tincture press. The juice, as it runs off, passes through a fine hair sieve into a cylindrical glass jug or jar, where it is allowed to remain for two hours, when the clear supernatant

liquor is poured off, and the thick portion containing the sediment is placed on a bibulous paper filter, supported on linen, and allowed to drain, after which it is dried by a gentle heat in a stove. The product has a green color, and constitutes the *finest* elaterium. A paler and inferior article is obtained from the mother liquor, poured from the first sediment by placing it in shallow pans and allowing it to deposite.

Remarks. To procure a fine article of elaterium it is necessary to remove it as soon as it is deposited, as a heavy mucilage falls down soon afterwards, which materially injures its *quality* and appearance. Good elaterium yields from 50 to 60% of its weight to strong alcohol, and from 25 to 44% of elaterin. (See EXTRACT OF ELATERIUM.)

ELECTROTYPE. ELECTROMETALLURGY. The art of working in metals by means of voltaic electricity. The most simple and easily managed electrotype apparatus, is formed in a similar manner to the common constant battery, but instead of employing a plate of copper for the negative element, a mould of the object to be copied, the face of which has been covered with plumbago, is substituted. An electrograph of this kind may be made of any well-glazed earthen jar or vessel, and the following arrangement will be found convenient for most of the purposes to which this art is applied by the amateur; viz. copying medals, multiplying plates, &c.



a. An oval vessel of salt glazed earthenware or wood, nearly filled with a concentrated solution of sulphate of copper.

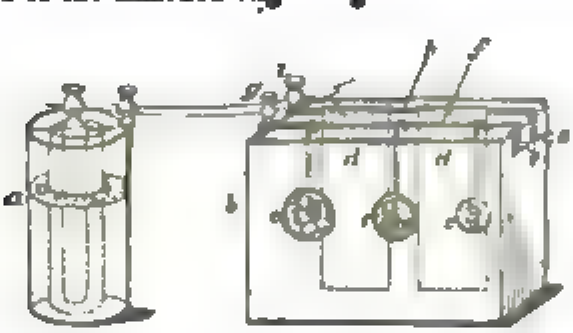
b. A porous diaphragm, containing the cylinder of zinc *c*, and filled with dilute sulphuric acid.

d. A small bar of brass or copper, fastened to the vessel by the binding screws *e*, *e*, and supporting the cylinder of zinc *c*, by the hook of copper wire *f*, and the mould *g*, by the hook *h*.

i. A small shelf or partition to support crystals of sulphate of copper, to keep up the strength of the solution.

Another method is to employ a trough or decomposition cell connected with a constant battery, by which means several moulds may be coated at once.

This arrangement will be understood by reference to the annexed engraving:



a. A constant battery. (See BATTERY.)

b. Decomposition cell; a cubical vessel made of wood, or earthenware, and filled with a mixture of 1 part of dilute sulphuric acid and 2 parts of concentrated solution of sulphate of copper.

c, c, c. Moulds suspended to the brass rod *f*, and connected with the copper or negative element of the battery *a*, by means of the screw *g*.

d, d. Pieces of sheet copper suspended on the brass rod *h*, and connected with the zinc end of the battery, by means of the screw *i*, employed to keep up the strength of the cupreous solution in the decomposition cell.

When it is desired to copy any object by either of these apparatuses, an exact mould must be first procured. Supposing the article to be a medal, for instance, a hoop of paper is commonly placed round it, and white wax, or any similar substance, poured on it in a melted state, and then allowed to cool, when it is removed, a small piece of copper wire to suspend it by is attached, and its face brushed over with finely-powdered plumbago, by means of a camel-hair pencil; the excess and loose portion being carefully removed. The mould so prepared is next suspended in the apparatus, to receive a deposite of metal on its surface. Some persons experience considerable difficulty in procuring moulds free from air bubbles, but this inconvenience is readily avoided, by removing with a camel-hair pencil any that may be observed on the surface of the medal, after the melted wax is poured on, and while it remains liquid and transparent. Stearine, hard tallow, shellac, rosin softened with a *little* oil, plaster of Paris, sealing wax, fusible metal, and numerous other substances are employed as materials for moulds. When plaster of Paris is used, it is necessary to imbue its surface with melted wax, to enable it to retain the plumbago. Fusible metal requires no preparation.

After the mould has received a sufficiently thick deposite, the latter is separated, washed in a little clean water, and bronzed. Any of the methods mentioned under "BRONZING OF METALS," may be employed for this purpose, but either the first or second will be found the simplest and most convenient. The length of time required to produce a deposite of any given thickness, depends upon the temperature of the solution and the state of the battery. Other things being equal, this takes place more rapidly the higher the temperature, within given limits. In very cold water, the operation proceeds exceedingly slowly.

The tyro in electrotype manipulation, frequently experiences much annoyance from the metal being deposited on the surface of the mould, under the form of a powder, or in a very friable or brittle state. This generally arises from the battery being in too active a condition. It is found that the slower the deposite is formed, the tougher and more perfect it will be. Air-bubbles may be avoided by brushing them off the face of the mould after immersion in the decomposition cell, and by properly regulating the action of the battery. The dilute sulphuric acid employed to excite the zinc end of the battery, should never be stronger than 1 part of concentrated acid, to 8 or 9 parts of water. Iron may be substituted for zinc, and is more economical.

In gilding, silvering, or platinizing the common metals, by electricity, solutions of gold, silver, or platina, are placed in the decomposition cell, or around the moulds, and plates of those metals, instead of copper, suspended in the solution.

ELECTUARY. *Syn.* ELECTUARIUM, (*Lat.,*

om 'Εκλεικτόν.) Vegetable and light earthy powders, mixed up with honey, sirup, or sugar, to the consistence of a thick paste. In the present Pharmacopœia, electuaries are included under the title CONFECTION, but this arrangement is manifestly improper, as these words are not synonymous. "In CONSERVES (or confections) the addition of the saccharine matter is in much larger proportion, and is designed to preserve the vegetable matter; in ELECTUARIES the sirup is designed merely to communicate the required form." (Dr. Murray.)

The preparation of electuaries is similar to that of confections and conserves, and the same precautions must be observed to reduce the dry ingredients to very fine powder, and vegetable substances to a minutely divided state. Care must also be taken to diffuse the ingredients equally through every portion of the mass, by patient and laborious pounding or stirring. An inattention to this point has often led to disagreeable consequences, from some portion of the electuary being nearly inert, while another portion has possessed increased activity. (See CONSERVES and CONFECTIONS.)

ELECTUARY, AROMATIC. *Syn.* ELECTUARIUM AROMATICUM, (P. E.) *Prep.* Aromatic powder (P. E.) 1 part; sirup of orange-peel 2 parts; mix.

Remarks. This preparation differs from the aromatic confection of the other British Colleges, in not containing chalk. It is aromatic and stomachic, but not antacid or absorbent.

ELECTUARY, BLACK. *Syn.* ELECT. NIGRUM. TROUSSEAU'S BLACK TONIC. *Prep.* Perchloride of iron ʒiv; tannin ʒj; confection of roses ℥ij; sirup of orange ℥j; mix. Tonic and astringent.

ELECTUARY, CATHARTIC. *Syn.* E. CATHARTICUM. Confection of senna ℥iss; flowers of sulphur ℥ss; sirup of roses or orange peel q. s.

Dose. A teaspoonful 3 or 4 times a day in piles. A mild and excellent medicine.

ELECTUARY, DEMULCENT. *Syn.* E. DEMULCENS. *Prep.* Spermaceti, sirup of poppies, and sirup of tolu, of each ʒij; powdered gum tragacanth ʒj; confection of roses ʒvj; nitre ʒss; mix.

Dose. A piece the size of a small nutmeg frequently.

ELECTUARY, EMMENAGOGUE. *Syn.* E. EMMENAGOGICUM. *Prep.* Myrrh 1 dr.; ammoniated iron 1 scruple; ginger sirup to mix.

Dose. A piece the size of a nutmeg, night and morning.

ELECTUARY, FEBRIFUGE. *Syn.* E. FEBRIFUGUM. *Prep.* (E. H.) Powdered cinchona ℥j; sal ammoniac ʒj; sirup of lemon juice q. s. In fevers.

ELECTUARY FOR DYSENTERY. *Syn.* E. ANTI-DYSENTERICUM. *Prep.* (P. E. 1744.) Electuary of catechu, mixed with half its weight of Locatel's balsam.

ELECTUARY FOR EPILEPSY. *Syn.* E. ANTI-EPILEPTICUM. *Prep.* (Dr. Mead.) Powdered cinchona ℥j; valerian and tin (both in powder) of each ℥ss; sirup to mix.

ELECTUARY FOR THE CHOLERA. *Syn.* E. ANTI-CHOLERICUM. *Prep.* Mix together equal parts of finely-powdered and newly-burnt charcoal, lard, and maple sugar. A popular remedy

ELECTUARY FOR THE PILES. *Syn.* E HÆMORRHOIDALE. *Prep.* (Dr. Copland.) Cream of tartar ℥j; precipitated sulphur ʒiij; confection of senna ℥ij; sirup of orange or ginger to mix.

Remarks. An excellent medicine for piles. *Dose.* A teaspoonful 3 or 4 times a day. From the difficulty experienced in procuring *pure* precipitated sulphur, the flowers of sulphur may be advantageously substituted.

ELECTUARY FOR THE TEETH. *Syn.* E. DENTIFRICUM. *Prep.* I. (Coral dentifrice. *E. Gingivale.*) *a.* Red coral 4 oz.; cuttle-fish bone 1 oz.; cream of tartar 2 oz.; cochineal 1 dr.; alum ½ dr.; (all in fine powder;) clarified honey 10 oz.; mix.

b. Clarified honey 12 oz.; tincture of myrrh 3 oz.; oil of cajeput 10 drops; oil of cassia or cinnamon 20 drops; tincture of cochineal 1 dr.; cream of tartar ½ oz.; mix.

II. Myrrh 3 oz.; cream of tartar and cochineal, of each 1½ oz.; powdered cloves 1 oz.; honey 4 oz.; mix.

III. To the last add 1 dr. of powdered orris root and 5 drops of otto of roses.

Remarks. All the above are used to whiten and preserve the teeth, but are most serviceable in foul or scorbutic gums.

ELECTUARY FOR WORMS. *Syn.* E. VERMIFUGUM. E. ANTHELMINTICUM. *Prep.* I. (Bresmer.) Worm seed and tansy seed, of each ʒiv; powdered valerian root ʒij; ditto jalap and sulphate of potash, of each ʒiss to ʒij; oxymel of squills to mix.

II. Powdered tin ℥iij; confection of red roses ℥ss; orange sirup to mix. *Dose.* A tablespoonful early in the morning for 3 or 4 successive days, followed by a cathartic.

III. (Dr. Cheston.) Powdered tin ℥iv; confection of wormwood ℥iij; carbonate of iron ℥j; mix.

ELECTUARY OF ANTIMONY. *Syn.* E. ANTIMONII. *Prep.* (P. C.) Prepared sulphuret of antimony, gum guaiacum, and black sulphuret of mercury, of each ʒj; confection of senna ʒij; sirup to mix.

Diaphoretic and alterative. *Dose.* 1 to 2 drachms twice a day in chronic cutaneous diseases, combined with sarsaparilla or decoction of elm bark.

ELECTUARY OF CASSIA. *Syn.* E. CASSIÆ. *Prep.* (P. D.) Fresh cassia pulp and sirup of orange, of each lb. ss; manna ℥ij; tamarind pulp ℥j; mix and evaporate to a proper consistence.

Dose. 2 dr. to 1 oz. It is gently laxative, and is chiefly used as a purge for children, or as a vehicle for other cathartics. It is commonly made with equal parts of tamarind and cassia pulps, mixed with ⅛ of manna, and flavored with a few drops of tincture of orange peel, without any evaporation.

ELECTUARY OF CATECHU. *Syn.* E. CATECHU. *Prep.* (P. E.) Powdered catechu, and kino, of each ℥iv; cinnamon and nutmegs, of each ℥j; opium (dissolved in a little sherry) ʒiss; sirup of red roses (evaporated to the consistence of honey) 1½ pints.

ELECTUARY OF CATECHU, COM-

POUND. *Syn.* E. Catechu compositum. *Prep.* (P. D.) Catechu ℥iv; kino ℥iij; cinnamon ℥ij; ginger sirup (boiled as above) lb. j, ℥iij; hard refined opium (diffused in wine as above) ʒiss; mix.

Remarks. Both the above are astringent and aromatic. *Dose.* ℈j to ʒij in diarrhœa, dysentery, &c.

ELECTUARY OF CHARCOAL. *Syn.* E. Carbonis. *Prep.* Newly-burnt and finely-powdered charcoal and carbonate of soda, of each ʒij; confection of senna ℥iv; mix.

ELECTUARY OF CINCHONA AND SODA. *Syn.* E. Cinchonæ cum Soda. *Prep.* (P. C.) Powdered cinchona ℥j; carbonate of soda ʒij; thin mucilage to mix. *Dose.* 2 dr. 2 or 3 times a day.

ELECTUARY OF COPAIBA. *Syn.* E. Copaibæ. *Prep.* (Caspar.) Blanched almonds ʒvj; powdered althæa ʒj; catechu ʒss; balsam of copaiba ʒiij; mix.

ELECTUARY OF COWHAGE. *Syn.* E. Dolichi. E. Mucunæ. *Prep.* (Chamberlain.) Dip the pods into treacle, withdraw, and scrape off the hairs, repeating the process with fresh pods till sufficiently thick.

Dose. One teaspoonful in the morning fasting, followed by a purgative a day or two afterwards. Vermifuge. (See also E. for Worms.)

ELECTUARY OF HELLEBORE. *Syn.* E. Hellebori Albi. *Prep.* Bruised white hellebore root lb. j; water 1 gallon; boil to one half, strain, add honey lb. iij; and evaporate to a proper consistence.

ELECTUARY OF IRON. *Syn.* E. of Steel. E. Chalybeatum. *Prep.* (Collier.) *a.* Potassio-tartrate of iron ℥ss; confection of red roses ℥j; sirup to mix.

b. Precipitated sesquioxide of iron ℥j; honey ℥ij; ginger sirup ℥ss; mix.

Both the above are tonic. *Dose.* One teaspoonful thrice a day.

ELECTUARY OF LAUREL BERRIES. *Syn.* E. è Baccis Lauri. *Prep.* Leaves of rue, caraway seeds, parsley seed, and laurel berries, of each ℥j; gum sagapenum ʒss; black pepper and Russian castor, of each ʒij; honey ℥xv; mix. (See Confection of Rue.)

ELECTUARY OF MUSTARD. *Syn.* E. Sinapis. *Prep.* (P. C.) Flour of mustard and conserve of roses, of each ʒiv; ginger sirup to mix.

ELECTUARY OF OLIBANUM. *Syn.* E. Olibani. *Prep.* (P. C.) Powdered olibanum, and balsam of copaiba, of each ʒiv; confection of hips ℥j; sirup to mix.

ELECTUARY OF OPIUM. *Syn.* E. Thebaiacum. E. Opii. E. Opiatum. *Prep.* (P. E.) Aromatic powder ℥iv; senega ℥iij; opium (diffused in a little sherry) ℥ss; sirup of ginger lb. j; mix.

ELECTUARY OF PEPPER. *Syn.* E. Piperis. *Prep.* (P. E.) Black pepper and liquorice root, in fine powder, of each lb. j; fennel lb iij; honey and white sugar, of each lb ij; mix. *Use, &c.* Same as confection of black pepper.

ELECTUARY OF SCAMMONY. *Syn.* E. Scammonii. *Prep.* (P. D.) Powdered scammony ℥iss; cloves, bruised, and ginger, in powder, of each ʒvj; oil of caraway ʒss; sirup of roses to mix. A stimulant cathartic. *Dose.* 10 grs. to ½ dr.

ELECTUARY OF SULPHUR. *Syn.* E. Sulphuris. *Prep.* Flowers of sulphur 1 oz, and honey or treacle 2 oz; mix. Gently laxative *Dose.* A teaspoonful night and morning in piles and some skin diseases.

ELECTUARY OF SULPHUR, COMPOUND. *Syn.* E. Sulphuris co. *Prep.* I. (St. B. H.) Precipitated sulphur ℥ss; cream of tartar ʒj; honey ℥j; mix. An excellent laxative in piles. Flowers of sulphur may be substituted for precipitated sulphur in the above form. *Dose.* ʒj to ʒij.

II. Flowers of sulphur ℥ss; cream of tartar ℥j; confection of senna ℥ij; confection of black pepper ℥iss; sirup of ginger f℥j; mix. This is an excellent medicine. *Dose and Use.* As last.

ELECTUARY OF SULPHUR AND BORAX. *Syn.* E. Sulphuris cum Borace. *Prep.* Flowers of sulphur ℥j; cream of tartar ℥iss; borax ℥ss; confection of senna ℥iiss; sirup of orange peel to mix. *Dose.* 1 to 3 teaspoonfuls in diseases of the uterine organs and lower bowels.

ELECTUARY OF TURPENTINE. *Syn.* E. Terebinthinæ. *Prep.* (St. B. H.) Common turpentine ℥j; honey ℥ij; mix. *Dose.* 1 to 2 teaspoonfuls in complaints of the urinary organs, worms, &c.

ELECTUARY, PECTORAL. *Syn.* E. Pectorale. *Prep.* I. (P. E. 1744.) Conserve of roses ℥ij; compound tragacanth powder ℥ss; benzoic acid ʒj; sirup of tolu q. s.

II. Oxymel of squills, sirup of marshmallows, mucilage of gum arabic and sirup of tolu, of each ℥ss; powdered lump sugar ℥ij; mix.

ELECTUARY, STIMULANT. *Syn.* E. Stimulans. *Prep.* Gum ammoniacum (strained) ℥j; vinegar of squills ℥ss; mix with a gentle heat and spread on leather. As an application to the chest or pit of the stomach.

ELECTUARY, STOMACHIC. Green peppermint, lump sugar, and confection of orange-peel, of each equal parts; mix. *Dose.* A teaspoonful.

ELEMI. This resin is the produce of an unascertained tree, respecting which there have been various conjectures. The London and Dublin Colleges assign it to the amyris elemifera, but the Edinburgh College, with greater discretion, state it to be the "concrete resinous exudation from one or more unascertained plants." Dr. Pereira has suggested, that it may be the produce of the icica icicaribo, the canarium zephyrinum, or the canarium balsamiferum, but the question is still undecided.

The elemi of commerce is of a pale yellow color, exteriorly brittle, but soft and tough within; it has a warm bitter taste, and a fragrant aromatic smell, partaking of fennel and juniper. It is only partially transparent even in thin plates, is very fusible, and has a density a little greater than that of water. According to Bonastre, it consists of 84 per cent. of resin, 12·15 of a fragrant essential oil and a little bitter extractive. In medicine it is only employed in the preparation of the elemi ointment of the Pharmacopœia.

The elemi of the shops is often adulterated, but more frequently a factitious kind is sold for the genuine gum. This is formed by adding 1 part of balsam of Canada to 4 parts of yellow resin, in the melted state, but removed from the fire, after

which about $1\frac{1}{2}$ p. c. of oil of juniper, and half this quantity of oil of fennel are stirred in. This fraud may be detected by exposing the suspected article to heat, along with a little water, when its fragrance will evaporate, and the coarse terebinthinate smell of the resin will become readily distinguishable.

ELIXIR. (*From the Arabic* Elekser, *quintessence.*) A name formerly applied to various compound tinctures.

ELIXIR, ANTISCROFULOUS. *Syn.* E. ANTISCROFULOSUM. Ammoniated tincture of gentian.

ELIXIR, ASTHMATIC. *Prep.* Opium, oil of aniseed and camphor, of each 1 oz.; proof spirit 1 gallon. Digest a week.

ELIXIR, BOERHAAVE'S ANTI-ASTHMATIC. *Syn.* ELIXIR ANTIASTHMATICUM BOERHAAVII. A tincture made with aniseed, orris-root, asarabacca, sweet flag, liquorice, and elecampane. *Dose.* 20 to 40 drops.

ELIXIR, DAFFY'S. *Syn.* E. SALUTIS. COMPOUND TINCTURE OF SENNA. *Prep.* I. Jalap root 5 oz.; East India senna $1\frac{1}{2}$ lbs.; coriander seeds and aniseed, of each $\frac{1}{2}$ lb.; rhubarb $\frac{1}{4}$ lb.; shavings of red sanders wood 2 oz.; treacle 7 lbs., and subcarbonate of potash 2 oz., both dissolved in water $3\frac{1}{4}$ gallons; rectified spirit of wine $2\frac{1}{2}$ gallons. All the solids must be well bruised, and macerated in the mixed fluids for 14 days, when the whole must be pressed, and strained through a fine flannel bag. It is too glutinous to run through filtering paper.

II. (Dicey's.) Senna lb. j; guaiacum shavings, elecampane root, (dried,) aniseed, caraway seed, coriander seed, and liquorice root, of each lb. ss; stoned raisins lbs. ij; proof spirit or brandy 9 quarts. As last.

III. (Swinton's.) Jalap 3 lbs.; senna 1 lb.; coriander seeds, caraway seeds, liquorice root, and elecampane root, of each 4 oz.; moist sugar 2 lb.; rectified spirit of wine and water, of each 1 gallon. As last.

IV. Jalap and caraways, of each 1 lb.; senna, rhubarb, and aniseed, of each 2 lbs.; red sanders wood $\frac{1}{2}$ lb.; brown sugar 7 lbs.; proof spirit 10 gallons. As last.

V. Rhubarb (East India) 14 lbs. senna 56 lbs.; aniseed 7 lbs.; coriander seeds 6 lbs.; caraway seeds and red sanders wood, of each 5 lbs.; cassia bark and jalap, of each 3 lbs.; proof spirit 100 gallons. Digest for 14 days, press, strain, and add molasses 84 lbs. Mix well, and either clarify, or strain through flannel.

VI. For proof spirit in the preceding formulæ, use equal parts of spirit of wine and water.

Remarks. Daffy's elixir is a favorite purge with drunkards, and is a common and very popular remedy in flatulent colic, dyspepsia, &c. *Dose.* 1 to 4 tablespoonfuls.

ELIXIR, THE DEVIL'S. *Prep.* Pods of capsicum and cloves, (bruised,) of each ℥j; ginger and saffron, of each ℥iij; cantharides ʒv; proof spirit lbs. vij. Digest for 10 days. *Dose.* ʒss to ʒij, in mixtures. It is stimulating and aphrodisiac.

ELIXIR OF GARLIC. *Syn.* E. ALLII. *Prep.* Garlic roots 80 in number; rectified spirit 1 pint. Distil to dryness, and repeat the process with the same spirit from fresh roots a second and a third time, then add camphor ʒij. Diaphoretic. *Dose.* A teaspoonful twice a day.

ELIXIR DE GARUS. *Prep.* Myrrh ℥ss; aloes and saffron, of each ʒij; cinnamon, cloves, and nutmegs, of each ʒss; proof spirit 1 quart. Digest for 7 days, strain, and add sirup of maidenhair lbs. ij; orange-flower water ℥iss.

ELIXIR OF JALAP. *Syn.* E. JALAPÆ COMPOSITUM. *Prep.* Jalap ℥iv; scammony ʒiv; gamboge ʒij; rectified spirit 1 quart.

ELIXIR OF LONG LIFE. *Syn.* E. LONGÆ VITÆ. Tincture of rhubarb and aloes.

ELIXIR OF MYRRH. Tincture of savine, (comp.) P. L. 1788.

ELIXIR D'OR. *Syn.* ELIXIR OF GOLD. De La Motte's golden drops.

ELIXIR, PAREGORIC. Tincture of camphor (co.) and ammoniated tincture of opium.

ELIXIR PROPRIETATIS. Compound tincture of aloes.

ELIXIR PROPRIETATIS CUM ACIDO. The last article acidulated with sulphuric acid.

ELIXIR PROPRIETATIS TARTARIZATUM. The elixir proprietatis alkalized with salts of tartar.

ELIXIR, PECTORAL. *Syn.* E. PECTORALE. *Prep.* (P. E. 1744.) Balsam of tolu ℥ij; gum benzoin ℥iss; saffron ℥ss; rectified spirit f℥xxxij. Digest in a sand heat for 4 days.

ELIXIR POLYCHRESTUM. *Prep.* (P. E 1744.) Gum guaiacum ℥vj; balsam of Peru ℥ss; rectified spirit 1 quart. Digest 4 days and strain.

ELIXIR SACRUM. Tincture of aloes and rhubarb.

ELIXIR SALUTIS. Tincture of senna.

ELIXIR, SQUIRE'S. *Prep.* Opium 2 oz.; camphor and cochineal, of each $\frac{1}{2}$ oz.; sweet fennel 1 drachm; tincture of serpentary 10 oz.; spirits of aniseed 1 gallon; water 1 pint; aurum musivum 3 oz.; mix.

ELIXIR, STOMACHIC. Compound tincture of gentian.

ELIXIR OF VITRIOL. *Syn.* E. VITRIOLI. Water strongly acidulated with sulphuric acid. See AROMATIC SULPHURIC ACID, which is also frequently called elixir of vitriol.

ELIXIR OF VITRIOL, SWEET. *Syn.* E. VITRIOLI DULCE. *Prep.* (P. E. 1744.) Spirit of sulphuric ether lbs. ij; oil of peppermint ℥ss; essence of lemons and oil of nutmegs, of each ʒij; mix. See AROMATIC SPIRIT OF ÆTHER, which is also called by this name.

ELIXIR OF VITRIOL, MYNSICHT'S. *Syn.* ACID E. OF VITRIOL. E. VITRIOLI MYNSICHTI. *Prep.* Cinnamon, ginger, and cloves, of each ʒiij; calamus aromaticus ℥j; smaller galangal ℥iss; sage and peppermint leaves, (dried,) of each ℥ss; cubebs and nutmegs, of each ʒij; aloes wood and lemon-peel, of each ʒj; sugar candy ℥iv; rectified spirit lbs. iss; oil vitriol lb. j. Digest for three weeks.

ELIXIR OF VITRIOL, VIGANI'S. *Prep.* Spirits of sulphuric ether ℥viij; aromatic tincture lb. j; mix.

ELLAGIC ACID. (From *Galle* reversed.) When an aqueous infusion of nut galls is left for some time exposed to the atmosphere, the tannic acid gradually disappears, and is replaced by gallic acid, and an insoluble gray powder, to which

the term ellagic acid was applied by Chevreul. It is soluble in alkalis, forming salts, and is precipitated by acids.

ELUTRIATION. *Syn.* ELUTRIATIO, (*Lat.*, from *elutrio*, to cleanse.) In CHEMISTRY, the operation of washing insoluble powders with water, to separate them from foreign matter, or the coarser portion. It is usually performed by grinding or triturating the mass with a little water, until reduced to a very fine powder, and this paste is suddenly diffused through a large quantity of water, in a deep vessel, from which, after the subsidence of the grosser portion, the liquid is poured into another vessel, and allowed to deposite the fine powder it still holds in suspension. When this has taken place, the clear supernatant liquor is decanted, and the sediment drained and dried. The coarse sediment deposited in the first vessel is now submitted to a fresh grinding and diffusion through water, and the entire operation is repeated, until the whole of the pulverizable portion is washed over. The proper length of time for the liquid to remain in the first vessel, depends solely on the density of the powder, and the degree of fineness required in the product; heavy powders subsiding almost immediately, while light ones often take several minutes to deposite their coarser portion. Sometimes three or more vessels are employed, and the muddy liquor, after remaining a short time in the first, is poured into the next one, and this, in a short time longer, into the third, and so on, until the last vessel is filled, by which means, powders of different degrees of fineness are obtained; that deposited in the last vessel being in the minutest state of division. (See CHALK, BISTRE, DECANTATION, EDULCORATION, &c.)

EMBROCATION. *Syn.* EMBROCATIO, (*Lat.*, from εμβρεχω, *I moisten.*) A fluid medicine rubbed on any part of the body.

EMBROCATION, COMMON. *Syn.* EMBROCATIO COMMUNIS. *Prep.* (U. C. H.) Sesquicarbonate of ammonia ℥iv; distilled vinegar 6½ pints; mix, and add proof spirit 3 pints.

EMBROCATION, GUESTONIAN. *Syn.* EMB. TEREBINTHINÆ. *Prep.* Oil of turpentine and olive oil, of each ℥iss; dilute sulphuric acid fℨiij; mix well. For rheumatism.

EMBROCATION FOR BRUISES. *Prep.* I. Soap liniment 5 oz.; liquor of ammonia 1 oz.; mix.

II. Soap liniment 3 oz.; oil of turpentine 2 oz.; camphor 1 oz.; mix.

III. Tincture of cantharides and rectified spirit, of each 1 oz.; camphor and oil of origanum, of each ½ oz.; mix.

IV. Sal ammoniac 1 oz.; distilled vinegar ½ pint; dissolve.

V. Sugar of lead ½ oz.; distilled vinegar and water, of each ½ pint; dissolve.

EMBROCATION FOR HOOPING COUGH, ROCHE'S. *Prep.* Sweet oil 2 oz.; oil of amber 1 oz.; oil of cloves 1 drachm; mix.

EMBROCATION FOR STRAINS. (*In Horses.*) *Prep.* I. Soft soap and oil of turpentine, of each 4 oz.; oil of rosemary and camphor, of each 1 drachm; mix.

II. Olive oil, oil of turpentine, and elder-flower ointment, of each 2 oz.; mix, and add oil of origanum 3 drachms.

EMBROCATION, LYNCH'S. *Prep.* Steep alkanet root in sweet oil until the latter becomes sufficiently colored, then scent with essential oils.

EMBROCATION OF ACETATE OF AMMONIA AND SOAP. *Syn.* EMB. AMMONIÆ ACETATIS CUM SAPONE. *Prep.* (P. C.) *a.* Soap liniment and solution of acetate of ammonia, of each 1 oz.; mix.

b. To the last add liquor of ammonia fℨiij. For sprains, bruises, &c.

EMBROCATION OF ALUM. *Syn.* EMB. ALUMINIS. Alum ½ oz.; distilled vinegar and proof spirit, of each ½ pint; mix. For chilblains, diseased joints, &c.

EMBROCATION OF AMMONIA. *Syn.* EMB. AMMONIÆ. *Prep.* Liquor of ammonia 1 oz.; proof spirit and water, of each 5 oz. As last.

EMBROCATION OF AMMONIA, CAMPHORATED. *Syn.* EMB. AMMONIÆ ACETATIS CAMPHORATA. *Prep.* I. Soap liniment and liquor of acetate of ammonia, equal parts; mix. For sprains, bruises, chilblains, &c.

II. To every ounce of the above, add 2 drs. of liquor of ammonia.

EMBROCATION OF CAMPHOR. *Syn.* EMB. CAMPHORÆ. *Prep.* I. Soap liniment and camphorated spirit of wine, equal parts.

II. (Collier.) Camphorated spirit of wine, essential oil of amber, and laudanum, equal parts.

EMBROCATION OF CANTHARIDES. *Syn.* EMB. LYTTÆ. EMB. CANTHARIDIS. *Prep.* Tincture of cantharides and camphorated spirit, of each 1 oz.; mix. Stimulant. It should be used with caution, lest the absorption of the cantharides induce strangury.

EMBROCATION OF SOAP. Soap liniment. The following is also a common form: soft soap 3 oz.; camphor 1 oz.; soap liniment ½ pint; water and spirit of wine, of each 6 oz.; spirits of hartshorn 4 oz.; mix. For sprains, bruises, chilblains, &c.

EMBROCATION, STIMULANT. *Syn.* EMB. STIMULANS. *Prep.* (Thompson.) *a.* Liquor of ammonia fℨij; olive oil fℨvj; mix. Used in sore throat, &c.

b. Compound camphor liniment fℨix; tincture of cantharides fℨj; laudanum fℨij; mix. Rubbed over painful joints, and over the bowels in colic and cramp. It is stimulant and anodyne.

EMBROIDERY. Gold and silver fancy work of this description may be easiest cleaned with a little spirit of wine, either alone, or diluted with an equal weight of water. The common practice of using alkaline or acidulous liquors is very injurious, and frequently destroys the beauty of the articles instead of cleaning them.

EMERALD. *Syn.* EMERAUDE, (*Fr.*) SMARAGD, (*Ger.*) A precious stone of a beautiful green color, and ranking next to the diamond in value. A fine emerald of 4 or 5 grains is worth as many pounds, one of 10 grs. about 2*l.* per gr.; one of 15 grs. 3*l.* to 4*l.* per gr., and so on in proportion to the increase in size. One of 24 grs. fetched 100*l.* According to Vauquelin, the emerald consists of 65% of silica, 16% of alumina, 13% of glucina, (about) 3% of oxide of chromium, and a trace of lime. The finest emeralds are obtained from Peru.

EMERALDS, FACTITIOUS. The follow-

ing method of obtaining artificial rubies and emeralds is exceedingly simple and inexpensive, and offers an ample field for the ingenious experimentalist. Recently precipitated and well washed hydrate of alumina is moistened with a few drops of neutral chromate of potassa, and kneaded so that the mass assumes a tinge scarcely perceptible; it is then rolled out into small sticks, about the thickness of a finger, and slowly dried, taking the precaution to fill the fissures that form during desiccation with fresh hydrate of alumina. When perfectly dry, one end of these sticks is brought into the termination of the flame of an oxyhydrogen blowpipe, until a portion of the mass is fused into a small globule. After the lapse of a few minutes, several minute balls, of some millimetres diameter, and of such intense hardness, that quartz, glass, topaz, granite, can be easily and perceptibly scratched therewith, will form. When cut and polished, they appear, however, slightly opaque. By employing nitrate of nickel in lieu of chromate of potassa, green-colored globules resembling the emerald were obtained. (Boettger.)

By the substitution of oxide of chromium for chromate of potassa, the editor of this work has procured factitious gems of considerable hardness and beauty, though slightly opaque in some portion of the mass. But this might doubtless be avoided by more careful manipulation. From some experiments in which a little silica was added, there was less opacity, though in other respects the stones were inferior.

EMETIC. *Syn.* Emetique, (*Fr.*) Emeticus, (*Lat.*) Εμετικος, (*Gr.*, from εμεω, I vomit.) A medicine which excites vomiting. The principal emetics are Ipecacuanha and Tartarized Antimony, and *their preparations;* and the sulphates of zinc and copper. The first of these is commonly employed either in substance or infused in wine, (wine of ipecacuanha,) when it is merely wished to evacuate the contents of the stomach, when that viscus is in a disordered state, or overloaded with food. At the beginning of fevers and other inflammatory disorders, the timely administration of an emetic will frequently induce copious diaphoresis and produce a cure, or at least greatly mitigate the severity of the symptoms. For this purpose emetic tartar or antimonial wine is preferable, either alone or combined with ipecacuanha. When poison has been taken, and the stomach-pump is not at hand, the sulphate of zinc or copper should be administered. ½ dr. of either of these substances should be dissolved in 3 or 4 oz. of water, and a third should be taken every ten minutes until vomiting is induced. The operation of emetics is powerfully promoted by drinking *copiously* of diluents, especially warm water. The latter, in fact, is itself an emetic, when taken in quantity. Its use will also prevent that dreadful straining and retching, which make emetics so much dreaded by some persons. Small and repeated doses of emetics are frequently administered to produce *nausea*, in many diseases of the lungs and stomach. Emetics should be avoided in plethoric habits, in hernia, pregnancy, and whenever an inflammatory diathesis exists. They should also be given with great caution to young children, and in such cases, wine or powder of ipecacuanha should alone be employed. Some chronic and obstinate diseases, especially rheumatism, are sometimes relieved by emetics.

EMETINE. *Syn.* Emetina. Emetin. La Matiere Vomitive. *Prep.* I. Digest coarsely-powdered ipecacuanha root, first in ether and then in alcohol. Evaporate the latter tincture to dryness, dissolve in water, and precipitate with acetate of lead. Wash the precipitate, diffuse it in distilled water, in a tall glass vessel, and pass sulphureted hydrogen through it, to throw down the lead; filter and evaporate to dryness. *Prod.* Brownish red, deliquescent scales. Emetic in doses of ¼ to ½ a gr. (Ann. de Chimie et de Physique.)

II. The powder of ipecacuanha is digested in water with calcined magnesia. The deposite is thrown on a filter, washed carefully with very cold water, and dried. The emetin is then taken up by alcohol. It may be afterwards combined with an acid, and the salt may be purified with animal charcoal. When the emetin is once more thrown down by magnesia, alcohol redissolves it in a colorless state. Emetin thus obtained is yellowish-white and pulverulent, but may be obtained perfectly white, by repeating the latter part of the process. White and pure emetin is emetic in doses of one-sixteenth of a grain.

Props. Emetin is pulverent, inodorous, and bitter; fusible at 122° F.; very soluble in alcohol, but only slightly so in ether, oils, and water. It partially neutralizes the acids, forming scarcely crystallizable salts. Tincture of iodine produces a reddish precipitate in an alcoholic solution of emetin. With tincture of galls this solution behaves like morphia; but, unlike the last substance, the salts of iron produce no change of color in it.

EMULSION. *Syn.* Emulsion, (*Fr.*) Emulsio, (*Lat.*, from *emulgeo*, to milk.) A milky fluid, formed by the mechanical admixture of oil and water, by means of some other substance that possesses the power of combining with both. The emulsions of the London Pharmacopœia, are included under the same head as mixtures. In the preparation of emulsions, the oily or resinous ingredients are usually suspended by means of mucilage of gum arabic; almonds, or new-laid eggs; 1 drachm of the first, made with equal parts of gum and water; 1 oz. of the second, (usually 26 in number,) and one in no. of the last, will form two drachms of any oil into an emulsion with about 1 oz. of water.

EMULSION, FARRIERS'. *Prep.* I. (*Simple.*) Sweet oil 2 oz.; honey or moist sugar 3 oz.; salts of tartar ¼ oz.; warm soft water 1 pint; mix and shake till quite cold.

II. (*Pectoral.*) Camphor 2 dr.; spirit of wine 1 oz.; oil of aniseed 20 drops; dissolve, then add of simple emulsion ¾ pint.

EMULSION OF ASAFŒTIDA. *Syn.* Emulsio Assafœtidæ. *Prep.* (Duclow.) Asafœtida ℥viij; powdered gum ℥xvj; oil of almonds 1½ pints; water 1 quart; make an emulsion, strain through linen, and keep it in a well-corked bottle. Antispasmodic.

EMULSION OF CAMPHOR. *Syn.* Mistura Camphoræ. E. do. E. Camphorata. *Prep.* (P. E. 1839.) Camphor ℈j; lump sugar ℥ss; triturate together, and add blanched almonds ℥ss; beat well, then gradually add water 1 pint. Stimulant, antispasmodic, and diaphoretic.

the term ellagic acid was applied by Chevreul. It is soluble in alkalis, forming salts, and is precipitated by acids.

ELUTRIATION. *Syn.* ELUTRIATIO, (*Lat.*, from *elutrio*, to cleanse.) In CHEMISTRY, the operation of washing insoluble powders with water, to separate them from foreign matter, or the coarser portion. It is usually performed by grinding or triturating the mass with a little water, until reduced to a very fine powder, and this paste is suddenly diffused through a large quantity of water, in a deep vessel, from which, after the subsidence of the grosser portion, the liquid is poured into another vessel, and allowed to deposite the fine powder it still holds in suspension. When this has taken place, the clear supernatant liquor is decanted, and the sediment drained and dried. The coarse sediment deposited in the first vessel is now submitted to a fresh grinding and diffusion through water, and the entire operation is repeated, until the whole of the pulverizable portion is washed over. The proper length of time for the liquid to remain in the first vessel, depends solely on the density of the powder, and the degree of fineness required in the product; heavy powders subsiding almost immediately, while light ones often take several minutes to deposite their coarser portion. Sometimes three or more vessels are employed, and the muddy liquor, after remaining a short time in the first, is poured into the next one, and this, in a short time longer, into the third, and so on, until the last vessel is filled, by which means, powders of different degrees of fineness are obtained; that deposited in the last vessel being in the minutest state of division. (See CHALK, BISTRE, DECANTATION, EDULCORATION, &c.)

EMBROCATION. *Syn.* EMBROCATIO, (*Lat.*, from εμβρεχω, *I moisten.*) A fluid medicine rubbed on any part of the body.

EMBROCATION, COMMON. *Syn.* EMBROCATIO COMMUNIS. *Prep.* (U. C. H.) Sesquicarbonate of ammonia ℥iv; distilled vinegar 6½ pints; mix, and add proof spirit 3 pints.

EMBROCATION, GUESTONIAN. *Syn.* EMB. TEREBINTHINÆ. *Prep.* Oil of turpentine and olive oil, of each ℥iss; dilute sulphuric acid f℥iij; mix well. For rheumatism.

EMBROCATION FOR BRUISES. *Prep.* I. Soap liniment 5 oz.; liquor of ammonia 1 oz.; mix.

II. Soap liniment 3 oz.; oil of turpentine 2 oz.; camphor 1 oz.; mix.

III. Tincture of cantharides and rectified spirit, of each 1 oz.; camphor and oil of origanum, of each ½ oz.; mix.

IV. Sal ammoniac 1 oz.; distilled vinegar ½ pint; dissolve.

V. Sugar of lead ½ oz.; distilled vinegar and water, of each ½ pint; dissolve.

EMBROCATION FOR HOOPING COUGH, ROCHE'S. *Prep.* Sweet oil 2 oz.; oil of amber 1 oz.; oil of cloves 1 drachm; mix.

EMBROCATION FOR STRAINS. (*In Horses.*) *Prep.* I. Soft soap and oil of turpentine, of each 4 oz.; oil of rosemary and camphor, of each 1 drachm; mix.

II. Olive oil, oil of turpentine, and elder-flower ointment, of each 2 oz.; mix, and add oil of origanum 3 drachms.

EMBROCATION, LYNCH'S. *Prep.* Steep alkanet root in sweet oil until the latter becomes sufficiently colored, then scent with essential oils.

EMBROCATION OF ACETATE OF AMMONIA AND SOAP. *Syn.* EMB. AMMONIÆ ACETATIS CUM SAPONE. *Prep.* (P. C.) *a.* Soap liniment and solution of acetate of ammonia, of each 1 oz.; mix.

b. To the last add liquor of ammonia f℥iij. For sprains, bruises, &c.

EMBROCATION OF ALUM. *Syn.* EMB. ALUMINIS. Alum ½ oz.; distilled vinegar and proof spirit, of each ½ pint; mix. For chilblains, diseased joints, &c.

EMBROCATION OF AMMONIA. *Syn.* EMB. AMMONIÆ. *Prep.* Liquor of ammonia 1 oz.; proof spirit and water, of each 5 oz. As last.

EMBROCATION OF AMMONIA, CAMPHORATED. *Syn.* EMB. AMMONIÆ ACETATIS CAMPHORATA. *Prep.* I. Soap liniment and liquor of acetate of ammonia, equal parts; mix. For sprains, bruises, chilblains, &c.

II. To every ounce of the above, add 2 drs. of liquor of ammonia.

EMBROCATION OF CAMPHOR. *Syn.* EMB. CAMPHORÆ. *Prep.* I. Soap liniment and camphorated spirit of wine, equal parts.

II. (Collier.) Camphorated spirit of wine, essential oil of amber, and laudanum, equal parts.

EMBROCATION OF CANTHARIDES. *Syn.* EMB. LYTTÆ. EMB. CANTHARIDIS. *Prep.* Tincture of cantharides and camphorated spirit, of each 1 oz.; mix. Stimulant. It should be used with caution, lest the absorption of the cantharides induce strangury.

EMBROCATION OF SOAP. Soap liniment. The following is also a common form: soft soap 3 oz.; camphor 1 oz.; soap liniment ½ pint; water and spirit of wine, of each 6 oz.; spirits of hartshorn 4 oz.; mix. For sprains, bruises, chilblains, &c.

EMBROCATION, STIMULANT. *Syn.* EMB. STIMULANS. *Prep.* (Thompson.) *a.* Liquor of ammonia f℥ij; olive oil f℥vj; mix. Used in sore throat, &c.

b. Compound camphor liniment f℥ix; tincture of cantharides f℥j; laudanum f℥ij; mix. Rubbed over painful joints, and over the bowels in colic and cramp. It is stimulant and anodyne.

EMBROIDERY. Gold and silver fancy work of this description may be easiest cleaned with a little spirit of wine, either alone, or diluted with an equal weight of water. The common practice of using alkaline or acidulous liquors is very injurious, and frequently destroys the beauty of the articles instead of cleaning them.

EMERALD. *Syn.* EMERAUDE, (*Fr.*) SMARAGD, (*Ger.*) A precious stone of a beautiful green color, and ranking next to the diamond in value. A fine emerald of 4 or 5 grains is worth as many pounds, one of 10 grs. about 2*l.* per gr.; one of 15 grs. 3*l.* to 4*l.* per gr., and so on in proportion to the increase in size. One of 24 grs. fetched 100*l.* According to Vauquelin, the emerald consists of 65% of silica, 16% of alumina, 13% of glucina, (about) 3% of oxide of chromium, and a trace of lime. The finest emeralds are obtained from Peru.

EMERALDS, FACTITIOUS. The follow-

ing method of obtaining artificial rubies and emeralds is exceedingly simple and inexpensive, and offers an ample field for the ingenious experimentalist. Recently precipitated and well washed hydrate of alumina is moistened with a few drops of neutral chromate of potassa, and kneaded so that the mass assumes a tinge scarcely perceptible; it is then rolled out into small sticks, about the thickness of a finger, and slowly dried, taking the precaution to fill the fissures that form during desiccation with fresh hydrate of alumina. When perfectly dry, one end of these sticks is brought into the termination of the flame of an oxyhydrogen blowpipe, until a portion of the mass is fused into a small globule. After the lapse of a few minutes, several minute balls, of some millimetres diameter, and of such intense hardness, that quartz, glass, topaz, granite, can be easily and perceptibly scratched therewith, will form. When cut and polished, they appear, however, slightly opaque. By employing nitrate of nickel in lieu of chromate of potassa, green-colored globules resembling the emerald were obtained. (Boettger.)

By the substitution of oxide of chromium for chromate of potassa, the editor of this work has procured factitious gems of considerable hardness and beauty, though slightly opaque in some portion of the mass. But this might doubtless be avoided by more careful manipulation. From some experiments in which a little silica was added, there was less opacity, though in other respects the stones were inferior.

EMETIC. *Syn.* Emetique, (*Fr.*) Emeticus, (*Lat.*) Εμετικος, (*Gr.*, from εμεω, I vomit.) A medicine which excites vomiting. The principal emetics are Ipecacuanha and Tartarized Antimony, and *their preparations;* and the sulphates of zinc and copper. The first of these is commonly employed either in substance or infused in wine, (wine of ipecacuanha,) when it is merely wished to evacuate the contents of the stomach, when that viscus is in a disordered state, or overloaded with food. At the beginning of fevers and other inflammatory disorders, the timely administration of an emetic will frequently induce copious diaphoresis and produce a cure, or at least greatly mitigate the severity of the symptoms. For this purpose emetic tartar or antimonial wine is preferable, either alone or combined with ipecacuanha. When poison has been taken, and the stomach-pump is not at hand, the sulphate of zinc or copper should be administered. ½ dr. of either of these substances should be dissolved in 3 or 4 oz. of water, and a third should be taken every ten minutes until vomiting is induced. The operation of emetics is powerfully promoted by drinking *copiously* of diluents, especially warm water. The latter, in fact, is itself an emetic, when taken in quantity. Its use will also prevent that dreadful straining and retching, which make emetics so much dreaded by some persons. Small and repeated doses of emetics are frequently administered to produce *nausea*, in many diseases of the lungs and stomach. Emetics should be avoided in plethoric habits, in hernia, pregnancy, and whenever an inflammatory diathesis exists. They should also be given with great caution to young children, and in such cases, wine or powder of ipecacuanha should alone be employed. Some chronic and obstinate diseases, especially rheumatism, are sometimes relieved by emetics.

EMETINE. *Syn.* Emetina. Emetin. La Matiere Vomitive. *Prep.* I. Digest coarsely-powdered ipecacuanha root, first in ether and then in alcohol. Evaporate the latter tincture to dryness, dissolve in water, and precipitate with acetate of lead. Wash the precipitate, diffuse it in distilled water, in a tall glass vessel, and pass sulphureted hydrogen through it, to throw down the lead; filter and evaporate to dryness. *Prod.* Brownish red, deliquescent scales. Emetic in doses of ¼ to ½ a gr. (Ann. de Chimie et de Physique.)

II. The powder of ipecacuanha is digested in water with calcined magnesia. The deposite is thrown on a filter, washed carefully with very cold water, and dried. The emetin is then taken up by alcohol. It may be afterwards combined with an acid, and the salt may be purified with animal charcoal. When the emetin is once more thrown down by magnesia, alcohol redissolves it in a colorless state. Emetin thus obtained is yellowish-white and pulverulent, but may be obtained perfectly white, by repeating the latter part of the process. White and pure emetin is emetic in doses of one-sixteenth of a grain.

Props. Emetin is pulverent, inodorous, and bitter; fusible at 122° F.; very soluble in alcohol, but only slightly so in ether, oils, and water. It partially neutralizes the acids, forming scarcely crystallizable salts. Tincture of iodine produces a reddish precipitate in an alcoholic solution of emetin. With tincture of galls this solution behaves like morphia; but, unlike the last substance, the salts of iron produce no change of color in it.

EMULSION. *Syn.* Emulsion, (*Fr.*) Emulsio, (*Lat.*, from *emulgeo*, to milk.) A milky fluid, formed by the mechanical admixture of oil and water, by means of some other substance that possesses the power of combining with both. The emulsions of the London Pharmacopœia, are included under the same head as mixtures. In the preparation of emulsions, the oily or resinous ingredients are usually suspended by means of mucilage of gum arabic; almonds, or new-laid eggs; 1 drachm of the first, made with equal parts of gum and water; 1 oz. of the second, (usually 26 in number,) and one in no. of the last, will form two drachms of any oil into an emulsion with about 1 oz. of water.

EMULSION, FARRIERS'. *Prep.* I. (*Simple.*) Sweet oil 2 oz.; honey or moist sugar 3 oz.; salts of tartar ½ oz.; warm soft water 1 pint; mix and shake till quite cold.

II. (*Pectoral.*) Camphor 2 dr.; spirit of wine 1 oz.; oil of aniseed 20 drops; dissolve, then add of simple emulsion ½ pint.

EMULSION OF ASAFŒTIDA. *Syn.* Emulsio Assafœtidæ. *Prep.* (Duclow.) Asafœtida ℥viij; powdered gum ℥xvj; oil of almonds 1½ pints; water 1 quart; make an emulsion, strain through linen, and keep it in a well-corked bottle. Antispasmodic.

EMULSION OF CAMPHOR. *Syn.* Mistura Camphoræ. E. do. E. Camphorata. *Prep.* (P. E. 1839.) Camphor ℈j; lump sugar ℥ss; triturate together, and add blanched almonds ℥ss; beat well, then gradually add water 1 pint. Stimulant, antispasmodic, and diaphoretic.

EMULSION OF COPAIBA. *Syn.* E. COPAIBÆ. *Prep.* Balsam of copaiba, mucilage of gum, and simple sirup, of each ʒij; water ℥xij; mix. *Dose.* ½ oz. to an ounce 2 or 3 times a day in certain complaints.

EMULSION, CATHARTIC. *Syn.* E. PURGANS CUM RESINA JALAPÆ. *Prep.* (P. Cod.) Resin of jalap 10 grs.; white sugar ℥j; ½ the yelk of an egg; orange-flower water ʒij; water f℥iv; mix.

EMULSION OF GUM. *Syn.* E. ACACIÆ. MISTURA ACACIÆ. *Prep.* (P. E., 1839.) Sweet almonds, blanched, ʒx; white sugar ʒv; mucilage f℥iij; water 1 quart. In coughs, &c.

EMULSION OF OIL OF ALMONDS. *Syn.* E. OLEI AMYGDALÆ. *Prep.* Oil of almonds ʒiij; thick mucilage and simple sirup, of each ℥ss; rose water f℥j; distilled water ℥iij or ℥iv; mix.

Remarks. When well made, this is an elegant and efficient substitute for almond milk.

EMULSION OF PERUVIAN BALSAM. *Syn.* E. BALSAMICA. E. BALSAMI PERUVIANI. *Prep.* (Ger. H.) Balsam of Peru ʒiv; oil of almonds ʒvj; powdered gum ℥j; mix, and add cautiously rose water f℥vj.

EMULSION, PURGATIVE. *Syn.* E. PURGANS CUM SCAMMONIO. *Prep.* (P. Cod.) Virgin scammony 10 grs; milk f℥iv; sugar ʒiv; cherry-laurel water fʒij; mix.

EMULSION OF SPERMACETI. *Syn.* E. CETACEI. *Prep.* (F. H.) as emulsion of wax. Demulcent.

EMULSION OF TURPENTINE. *Syn.* E. TEREBINTHINÆ. *Prep.* Chio turpentine ʒij; white sugar ℥j; yelk of 1 egg; milk of almonds f℥iv; mix. In gleets.

EMULSION OF OIL OF TURPENTINE. *Syn.* E. OLEI TEREBINTHINÆ. *Prep.* Oil of turpentine ℈j; white sugar ℥j; yelk of one egg; mix. For nephritic pains.

EMULSION OF WAX. *Syn.* E. CERÆ. E. C. ALBÆ. *Prep.* (Guibourt.) White wax ℥j; powdered gum ʒiss; water f℥xxiv; simple sirup f℥iv; put the wax with the sirup and gum into a warm mortar, triturate with a warm pestle until united, then add the water (warm) gradually, and continue the agitation till quite cold. Demulcent.

ENAMELS. *Syn.* EMAUX, (*Fr.*) SCHMELZGLAS, (*Ger.*) Transparent or opaque substances, usually formed of glass colored with metallic oxides, and applied in a thin stratum to brightly polished metallic surfaces, (copper or gold,) on which they are fused by the flame of a lamp urged by the blowpipe, or by the heat of a small furnace, and in cooling form a sort of vitreous varnish. The art of enamelling acquired the greatest perfection in ancient times, and very beautiful specimens are still preserved, which the moderns are unable to equal, and with the materials of which they are totally unacquainted. At the present day, this pleasing and useful application of human industry is carried on with the greatest success by the Venetians, and, after them, by the French. The limits of this work will not permit a description of the various operations of enamelling, which essentially depend on skilful manipulation; a knowledge of which can only be obtained by long practice. The *preparation* of enamels being, however, entirely dependent on chemistry, I deem it proper to present the following formulæ to the reader. It is nevertheless right to remark, that almost every artist has his own receipts. (See GEMS, and PASTES.)

The basis of all enamels is a highly transparent and fusible glass, which readily receives a color on the addition of metallic oxides. As this is required in the preparation of many of those that follow, it is placed first.

ENAMELS, BASE OR FLUX FOR. *Prep.* Red lead 16 parts; calcined borax 3 parts; powdered flint glass 12 parts; powdered flints 4 parts; fuse in a Hessian crucible for 12 hours, then pour it out into water, and reduce it to a powder in a biscuit-ware mortar. (Wynn. *Trans. Soc. Arts*, 1817.)

II. Powdered flints 10 parts; nitre and white arsenic, of each 1 part; as last. (Wynn.)

III. Flint glass 3 oz.; red lead 1 oz.; as last. (Wynn.)

IV. Red lead 18 parts; borax (not calcined) 11 parts; flint glass 16 parts; as last. (Wynn.)

V. Flint glass 6 parts; flux No. II. (above) 4 parts; red lead 8 parts; as last. (Wynn.)

VI. Tin 2 to 5 parts; lead 10 parts; calcine in an iron pot at a dull cherry-red heat, and scrape off the oxide as it forms, observing to obtain it quite free from undecomposed metal: when enough of the dross is obtained, reduce it to fine powder by grinding and elutriation, then mix 4 parts of this powder with an equal weight of pure sand or powdered flints, and 1 of sea-salt, or other alkaline matter, fuse the mixture in a Hessian crucible, and proceed as before. The best proportions of the tin and lead, for all ordinary purposes, are about 3 of the former to 10 of the latter. The calcined mixed oxides are commonly called "*calcine.*"

VII. Lead and tin, equal parts; calcine as above; and take of the mixed oxides, or calcine and ground flints, of each 1 part; pure subcarbonate of potash 2 parts; as before. (Chaptal.)

VIII. Lead 30 parts; tin 33 parts; calcine as before, then mix 50 parts of the *calcine* with an equal weight of flints, in powder, and 1 lb. of salts of tartar; as before. A fine dead white enamel. (Neri. Kunckel.)

Remarks. The precise qualities of the products of the above processes depend greatly upon the duration and degree of heat employed. By increasing the quantity of sand, glass, or flux, the enamel is rendered more fusible, and the opacity and whiteness is increased by the addition of oxide of tin. The use of borax should be avoided, or used very sparingly, as it is apt to make the enamel effloresce and lose color. (Tilloch.)

ENAMELS, BLACK. *Prep.* I. Pure clay 3 parts; protoxide of iron 1 part; mix and fuse. A fine black. (Clouet.)

II. Calcined iron (protoxide) 12 parts; oxide of cobalt 1 part; mix and add an equal weight of white flux.

III. Peroxide of manganese 3 parts; zaffre 1 part; mix and add it as required to white flux.

ENAMELS, BLUE. *Prep.* Either of the fluxes colored with oxide of cobalt.

II. Sand, red lead, and nitre, of each 10 parts; flint glass or ground flints 20 parts; oxide of cobalt 1 part, more or less, the quantity wholly depending on the depth of color required.

ENAMELS, BROWN. *Prep.* I. Red lead

and calcined iron, of each 1 part; antimony, litharge, and sand, of each 2 parts; mix and add it in any required proportion to a flux, according to the color desired. A little oxide of cobalt or zaffre is frequently added, and alters the shade of brown.

II. Manganese 5 parts; red lead 16 parts; flint powder 8 parts; mix.

III. Manganese 9 parts; red lead 34 parts; flint powder 16 parts. (Wynn.)

ENAMELS, GREEN. *Prep.* I. Flux 2 lbs.; black oxide of copper 1 oz.; red oxide of iron ½ dr.; mix.

II. As above, but use the red oxide of copper. Less decisive.

III. Copper dust and litharge, of each 2 oz.; nitre 1 oz.; sand 4 oz.; flux as much as required.

IV. Add oxide of chrome to a sufficient quantity of flux to produce the desired shade: when well managed, the color is superb, and will stand a very great heat; but in common hands, it frequently turns on the dead-leaf tinge.

V. Transparent flux 5 oz.; black oxide of copper 2 scruples; oxide of chrome 2 grs. Resembles the emerald.

VI. Mix blue and yellow enamel in the required proportions.

ENAMELS, OLIVE. *Prep.* Good blue enamel 2 parts; black and yellow do., of each 1 part; mix. (See also BROWN ENAMELS.)

ENAMELS, ORANGE. *Prep.* I. Red lead 12 parts; red sulphate of iron and oxide of antimony, of each 1 part; flint powder 3 parts; calcine, powder, and melt with flux, 50 parts.

II. Red lead 12 parts; oxide of antimony 4 parts; flint powder 3 parts; red sulphate of iron 1 part; calcine, then add flux 5 parts to every 2 parts of this mixture. (Wynn.)

ENAMELS, PURPLE. *Prep.* I. Flux colored with oxide of gold, purple precipitate of cassius, or peroxide of manganese.

II. Sulphur, nitre, vitriol, antimony, and oxide of tin, of each 1 lb.; red lead 60 lbs.; mix and fuse, cool and powder, add rose copper 19 oz.; zaffre 1 oz.; crocus martis 1½ oz.; borax 3 oz.; and 1 lb. of a compound formed of gold, silver, and mercury; fuse, stirring the melted mass with a copper rod all the time, then place it in crucibles, and submit them to the action of a reverberatory furnace for 24 hours. (Phil. Mag.)

Remarks. This is said to be the purple enamel used in the mosaic pictures of St. Peter's at Rome.

ENAMELS, RED. *Prep.* I. Sulphate of iron (calcined dark) 1 part; a mixture of 6 parts of flux (IV.) and 1 of colcothar, 3 parts; dark red. (Wynn.)

II. Red sulphate of iron 2 parts; flux (No. I.) 6 parts; white lead 3 parts; light red. (Wynn.)

III. Paste or flux colored with the red or protoxide of copper. Should the color pass into the green or brown, from the partial peroxidizement of the copper, from the heat being raised too high, the red color may be restored by the addition of any carbonaceous matter, as tallow, or charcoal.

IV. The most beautiful and costly red, inclining to the purple tinge, is produced by tinging glass or flux with the oxide or salts of gold, or with the purple precipitate of cassius, which consists of gold and tin. In the hands of the skilful artist, any of these substances produce shades of red of the most exquisite hue: when most perfect, the enamel comes from the fire quite colorless, and afterwards receives its rich hue from the flame of a candle or lamp, urged by the blowpipe.

ENAMELS, ROSE-COLORED. *Prep.* Purple enamel, or its elements, 3 parts; flux 90 parts; mix and add silver-leaf, or oxide of silver, 1 part or less.

ENAMELS, TRANSPARENT. Either of the fluxes, except the last three. (See also PASTES.)

ENAMELS, VIOLET. *Prep.* Saline or alkaline frits or fluxes colored with small quantities of peroxide of manganese. As the color depends on the metal being at the maximum of oxidation, contact with all substances that would abstract any of its oxygen should be avoided. The same remarks apply to other metallic oxides.

ENAMELS, YELLOW. *Prep.* I. Red lead 8 oz.; oxide of antimony and tin, calcined together, of each 1 oz.; mix and add flux (No. IV.) 15 oz.; mix and fuse. (Wynn.) By varying the proportion of the ingredients, various shades may be produced.

II. Lead, tin ashes, litharge, antimony, and sand, of each 1 oz.; nitre 4 oz.; mix, fuse, and powder; and add the product to any quantity of flux according to the color required.

III. White oxide of antimony, alum, and sal ammoniac, of each 1 part; pure carbonate of lead 1 to 3 parts, as required; all in powder; mix, and expose to a heat sufficiently high to decompose the sal ammoniac. Very bright.

IV. Flux fused with oxide of lead, and a little red oxide of iron.

V. Pure oxide of silver added to the metallic fluxes. The salts of silver are also used, but are difficult to manage. If a thin film of oxide of silver be spread over the surface of the enamel to be colored, exposed to a moderate heat, then withdrawn, and the film of reduced silver on the surface removed, the part under will be found tinged of a fine yellow.

Remarks. Superior yellow enamels are less easily produced than most other colors; they require but little flux, and that mostly of a metallic nature.

ENAMELS, WHITE. *Prep.* I. *Calcine*, (from 2 parts of tin and 1 part of lead calcined together) 1 part; fine crystal or frit 2 parts; a very trifling quantity of manganese; powder, mix, melt, and pour the fused mass into clean water; dry, powder, and again fuse, and repeat the whole process 3 or 4 times, observing to avoid contamination with smoke, dirt, or oxide of iron. *A fine dead white.*

II. Washed diaphoretic antimony 1 part; fine glass (perfectly free from lead) 3 parts; mix, and proceed as before. *Very fine.*

Remarks. For white enamel, the articles must be perfectly free from foreign admixture, as this would impart a color. When well managed, either of the above forms will produce a paste that will rival the *opal.*

ENEMA. (*From* ἐνιέναι, to *inject.*) A clyster, glyster, lavement, or injection. Medicine usually liquid (*sometimes gaseous*) thrown into the rectum or lower bowels. The number of substances em-

ployed in the preparation of enemata is very great; the following are some of them, arranged according to their effects.

I. (Aperients or Cathartics.) Aloes, colocynth, senna, various purging salts, gruel, decoction of marshmallows, decoction of linseed, warm water, &c., are commonly employed to promote the peristaltic action of the bowels, and to destroy worms.

II. Tobacco infusion or smoke is employed to relax the powers of the body, to remove spasms, and to produce syncope.

III. Demulcents, as decoction of starch, gum, isinglass, glue, &c. either alone or combined with opium, are used to protect the coats of the intestines and to allay irritation; as also to restrain diarrhœa, especially when combined with astringents, as logwood, catechu, or oak bark.

IV. Animal jelly, soups, broths, milk, &c. are frequently used as injections to convey nourishment to the body.

V. Anodynes and narcotics, as opium, henbane, &c., are employed to allay spasms of the bowels, stomach, uterus, bladder, &c.

It is generally regarded that the susceptibility of the rectum is only ⅓ of that of the stomach, and that to exert a like absorbent action, it occupies 5 times as long as that viscus; and that, consequently, the dose and the interval between its repetition should be proportionally increased. This has been shown, however, not to be universally correct, for according to Orfila, and some other authorities, narcotics, as opium, tobacco, &c., are more readily absorbed by the rectum than the stomach. Others deny this altogether, and assert that 2 or 3 times the ordinary dose of opium may be exhibited per anum, without producing any remarkable effect. (Pereira, Christison.)

Clysters usually consist of some weak glutinous or mucilaginous fluid, to which the active ingredients are added; or a decoction or infusion is made of the medicaments. In either case the fluid is administered warm. The quantity for an adult may vary from ½ to ¾ of a pint; that for an infant within a month old, should be about 1 oz.; for a child 1 year old, about 2½ oz.; from 1 to 7 years, from 3 oz. to 4 oz.; and from that age to 12 or 14, from 6 to 7 oz.; after that age to puberty, ½ a pint may be employed. Clysters are usually administered by means of a syringe, bladder, or elastic bag, furnished with a rectum tube. Great care should be taken to avoid injuring the coats of the rectum by the use of an improperly shaped pipe, or one that is too long. A neglect of this point often produces very serious consequences in young children. The extremity of the pipe or tube should be perfectly smooth, well rounded, and rather *spherical* than *pointed*, and in using it *no force* should be employed. I once witnessed a case where a young infant lost its life, from an ignorant nurse forcibly thrusting the tube of a syringe through the upper parts of the rectum, in her attempt to administer a clyster.

Tobacco smoke may be administered by means of a double pair of bellows, supplied with air from a small funnel under which the herb is burning,—and gaseous matter, by connecting the rectum tube with a small gasometer, exerting a trifling pressure on the confined gas.

The injection of *large* quantities of liquid matter into the bowels, as well as the *constant* use of clysters, (even of warm water,) is deemed by the highest medical authorities to be injurious. The bowels, continually accustomed to a stimulant, cease to act without one.

ENEMA, ANODYNE. *Syn.* Enema Anodynum. *Prep.* Starch jelly ½ pint; laudanum 40 to 60 drops; mix. In dysentery, diarrhœa, cholera, colic, &c.

II. (*For horses.*) Opium 1½ dr., (or laudanum 1½ oz.;) water gruel 2 or 3 pints; mix.

ENEMA, ANTISPASMODIC. *Syn.* E. Antispasmodicum. *Prep.* Tincture of asafœtida ℥ss; laudanum 40 drops; thin gruel half a pint; mix. For spasmodic affections of the bowels.

ENEMA, ASTRINGENT. *Syn.* E. Astringens. *Prep.* (H.) Electuary of catechu ʒij; lime water f℥v; water 5 or 6 oz.; mix. In diarrhœa, &c., arising from a relaxed state of the coats of the intestines.

II. Any of the astringent decoctions (as pomegranate, cinchona, oak bark, galls, &c., 3 oz.; water or barley water 6 or 8 oz.; mix. As the last.

ENEMA, CATHARTIC. *Syn.* E. Catharticum. (*Purging clyster.*) *Prep.* I. (P. D.) Manna ℥j; compound decoction of chamomile ½ pint; add olive oil ℥j; Epsom salts ℥ss; mix.

II. (P. E.) Senna ℥ss; water f℥xvj; infuse, add Epsom salts ℥ss; sugar and olive oil, of each ℥j; mix well. Both the above are purgative.

III. Epsom salts ℥j; dissolve in water gruel or barley water ℥xj; then add sweet oil ℥j; mix well. Purgative.

IV. Compound decoction of mallows ½ pint; Epsom salts ℥j; sweet oil f℥ij; mix, as above.

V. (*For horses.*) Common salt 8 oz.; warm water 1 gallon; dissolve.

VI. (*For cows.*) Common salt 12 oz.; water 10 pints; dissolve.

ENEMA, COMMON. *Syn.* E. Commune. *Prep.* (St. B. H.) Barley water 1 pint; common salt ℥j; dissolve. Purgative. Decoction of mallows, linseed tea, or water gruel, may also be used as the solvent.

ENEMA, DOMESTIC. *Syn.* E. Domesticum. *Prep.* (E. H.) Milk ½ pint; sugar or honey and olive oil, of each ℥j; mix. Laxative and nutritive.

II. Mutton broth and oil, of each 4 oz.; brown sugar 1 oz.; dissolve. As last.

ENEMA, EMOLLIENT. *Syn.* E. Emolliens. *Prep.* (H.) Decoction of linseed, barley, or starch, 1 pint; linseed or olive oil 1 oz.; mix. Emollient; demulcent.

ENEMA FOR COLIC. *Syn.* E. Anticolicum. *Prep.* Infusion of chamomile f℥x; oil of cajeput or peppermint 5 drops; (dissolved in) sweet spirits of nitre 40 drops; laudanum 10 drops; mix.

ENEMA FOR FEVER. *Syn.* E. Febrifugum. *Prep.* (Collier.) Thin gruel f℥xij; sugar ℥j; mix. In low fevers.

ENEMA FOR WORMS. *Syn.* E. Vermifugum. *Prep.* (Collier.) Oil of turpentine f℥j; olive oil ½ pint; mix. In ascarides.

ENEMA, LAXATIVE. *Syn.* E. Laxativum. *Prep.* (Richard.) Linseed and senna, of each ℥ss;

water 1½ pint; boil to a pint, strain and add glauber or Epsom salts ℥ij to ℥iij.

ENEMA, NOURISHING. *Syn.* E. Nutriens. *Prep.* Strong beef tea 12 oz.; thicken with hartshorn shavings or arrow-root. To nourish the body when aliments cannot be received by the mouth or retained by the stomach.

ENEMA OF ALOES. *Syn.* E. Aloës. (P. L.) *Prep.* Aloes ℈ij; carbonate of potassa 15 grs.; barley water f℥x; mix. In ascarides, atonic amenorrhœa, &c. It should not be employed when irritability of the rectum, bladder, or genitals exists, nor in piles.

ENEMA OF ASAFŒTIDA. *Syn.* E. Fœtidum. (P. E. & D.) *Prep.* Add f℥ij of tincture of asafœtida to the cathartic clyster. Stimulant, antispasmodic, carminative, and purgative. An excellent remedy in hysteria, flatulent colic, infantile convulsions, worms, hooping-cough, &c.

ENEMA OF CAMPHOR. *Syn.* E. Camphoræ. Camphor Clyster for Horses. *Prep.* Camphor ½ oz.; dissolve in sweet oil by heat; add ¼ oz. of subcarbonate of potash, mix well together, and add gradually warm water 1 quart. Diuretic. In difficult or obstructed micturition.

ENEMA OF COPAIBA. *Syn.* E. Copaibæ. *Prep.* (Collier.) Balsam of copaiba ℥ij; oil of turpentine ℥iv; extract of opium 1 gr.; make an enema with the yelk of egg. In ascarides and certain complaints.

ENEMA OF COLOCYNTH. E. Colocynthidis. (P. L.) *Prep.* Compound extract of colocynth ℈ij; soft soap ℥j; warm water 1 pint; carefully mix the first two by trituration, then gradually add the water. A strong purgative in colic and constipation without spasms.

ENEMA OF OPIUM. *Syn.* E. Opii. E. Opiatum. E. Anodynum. *Prep.* (P. L.) Decoction of starch f℥iv; laudanum 30 drops; mix.

II. (P. E.) Starch ℥ss; laudanum 30 to 60 drops; water f℥ij; make the starch into a mucilage with the water, boiling; and when cooled sufficiently, add the tincture.

III. (P. D.) Laudanum ℨj; water ℥vj; mix.

Remarks. The above are the orders of the Colleges, but in practice the quantity of laudanum is frequently doubled; this should, however, be done with great care. Opium clysters are used in dysentery, colic, cholera, and various painful affections of the intestines, bladder, &c. The bowels should be emptied before its administration, and in inflammatory complaints it should not be used for the first 48 hours. Clysters containing opium, even in small quantities, are dangerous remedies for young children.

ENEMA OF TOBACCO. *Syn.* E. Tabaci. (P. L.) *Prep.* Tobacco ℨj; boiling water 1 pint; macerate for 1 hour, and strain. Violently depressing and relaxing; producing fainting. It is exhibited in strangulated hernia, &c.: 3 parts of Virginian tobacco are equal to 7 parts of any other kind. (Davy.)

ENEMA OF TURPENTINE. *Syn.* E. Terebinthinæ. (P. L.) *Prep.* Oil of turpentine f℥j; yelk of egg, a sufficiency; rub together until united, then add barley water f℥xix; mix. In calculus, flatulent colic, ascarides, &c. (See Enema for Worms.)

ENEMA OF SOAP. *Syn.* E. Saponis. *Prep.* (St. B. H.) Soft soap ℥vj; hot water 1 pint; dissolve.

ENEMA, STIMULANT. *Syn.* E. Stimulans. (F. H.) Colocynth pulp ℨj; boil in water 1 pint till reduced to two-thirds, then add common salt and sirup of buckthorn, of each ℨj. Cathartic.

II. (For Horses.) Common salt and linseed oil, of each 8 oz.; hot water 1 gallon; gum arabic 1 oz.; mix. In stomach staggers.

ERGOT. *Syn.* Spurred Rye. Secale Cornutum. Ergota. Diseased grains of rye, much used as an emmenagogue in small doses, and to accelerate the contraction of the uterus in protracted labor. The dose is 10 to 15 grs. every 10 or 15 minutes, either in powder, or made into an infusion.

Pres. Ergot of rye deteriorates greatly by age. It is fed on by a description of acarus resembling the cheese mite, but much smaller, and this insect in time destroys the whole of the internal portion of the grain, leaving nothing but the shell, and a considerable quantity of excrementitious matter. To prevent this the ergot should be well dried, and then placed in bottles or tin canisters, and closely preserved from the air. The addition of a few cloves, or drops of the oil of cloves, or strong acetic acid, or a little camphor, or camphorated spirit of wine, will preserve this substance for years in close vessels. The following method has been proposed by M. Martin, and is likely to prove efficacious, but is somewhat troublesome:—

Ergot in good condition and very dry is steeped in a concentrated solution of gum arabic, and dried on a sheet of white iron. When it is dry the operation is repeated: two or three immersions are sufficient. When the last layer of gum is perfectly dry, the ergot is kept in a very dry and well-corked flask. Gum arabic cannot be prejudicial to the effect of ergot of rye. (*Jour, de Chimie Med.* 1841.)

Ergot is mostly kept in large well covered tin canisters or boxes, by the wholesale druggists, and these are placed in a dry situation.

ERGOTINE. *Syn.* Ergotina. A substance discovered by Wiggers in ergot of rye, and of which it appears to be the active constituent.

Prep. Submit ergot (previously ground in a coffee-mill, not powdered) to the action of ether to remove the fatty portion, then digest it in boiling alcohol, and evaporate the latter solution to the consistence of a sirup; treat this fluid extract with water, which will dissolve the foreign matter, and leave the ergotine behind. It may be further purified by re-solution in hot alcohol.

Props., Uses, &c. Ergotine, as thus prepared, has a brownish red color, an acrid bitter taste, and a peculiar unpleasant odor when warmed. Nine grs. are said to be equivalent to 1½ oz. of ergot.

ERGOT, ESSENTIAL SOLUTION OF. (Lever's.) *Prep.* Ergot, coarsely powdered, ℥iv; ether f℥iv; digest for 7 days; submit to spontaneous evaporation, and dissolve the residuum in ether f℥ij. *Dose.* 15 to 30 drops on sugar. It exercises a similar action on the uterus to the crude ergot.

ERUCINE. A yellowish white substance, discovered by Simon in white mustard, (sinapis alba.) It is soluble in ether and essential oils, and in boiling alcohol.

ERYTHRINE, Pseudo-erythrine, Erythriline, Amarythrine, Telerythrine. Substances obtained by Kane and Heeren from parmelia roccella and leconara Tartarea. The names have been differently applied by these authorities, and hence has arisen some confusion. They are of little interest except in a theoretical point of view.

ERYTHROLEINE, Erythrolitmine, Azolitmine, Azoerythrine, Spaniolitmine, Erythroleic Acid. Substances obtained from litmus and archil by Kane. They are but little known, and have not been applied in the arts.

ESCHAROTIC. *Syn.* Escharoticus. (Lat., from ἐσχαροω, *to scab over.*) Any substance that destroys the texture of living organic substances, with the production of an eschar (ἐσχαρα) or scab. Escharotics have been divided into *eroding escharotics;* as blue vitriol, red precipitate, burnt alum, &c.; and into *caustic escharotics;* as lunar caustic, pure potassa, strong sulphuric acid, nitric acid, &c. All caustics that produce a scab, or eschar, are properly escharotics. (See Caustics.)

ESCHAROTIC SOLUTION. (Freyburg's.) *Prep.* Camphor 30 grs.; corrosive sublimate 460 grs.; strong alcohol 450 grs.; dissolve. This is employed in the Hospital of Charity at Berlin in syphilitic vegetations, and especially against condylomes. It is spread over the diseased surface, either at once, or after the application of a ligature.

ESCULENTS. (Esculentus, *Lat.*) Animal and vegetable substances used for food.

ESCULIC ACID. A peculiar acid found by M. Bussy in the bark of the horse-chesnut. It is but little known, and has not been applied to any use.

ESENBECKINE. An alkaloid found by Buchner in the esenbeckia febrifuga.

ESPRIT. (*Fr.*) Spirit. This term is applied to alcoholic solutions of the essential oils and to various odorous and aromatic essences. Sold by the perfumers.

ESPRIT DE BERGAMOTTE. *Syn.* Spirit of Bergamotte. *Prep.* Peel of the Bergamotte orange 2 lbs.; proof spirit 1 gallon; digest for a week, add water 1 quart, and distil 1 gallon.

II. Essence of bergamotte (best) 5 oz.; essence of ambergris (pale) 2 oz.; essence of musk ½ oz.; oil of verbena ¼ oz.; rectified spirit of wine 1 gallon; mix. An elegant perfume.

ESPRIT DE LA ROSE. *Syn.* Spirit of Roses. *Prep.* I. Fresh petals of roses 8 lbs.; rectified spirit of wine ½ gallon; macerate for a week, and distil to dryness in a water bath.

II. Salted petals 14 lbs.; spirit of wine 4½ pints; distil ½ gallon.

III. Attar of roses 2 dr.; neroli 20 drops; spirit of wine 1 gallon; dissolve, add chloride of calcium, well dried and in powder, 1 lb.; agitate well, and distil 7 pints. Very fine.

IV. Spirit of wine 1 quart; otto ½ drachm; mix, place the bottle in hot water so as to warm the spirit, then cork close, shake until cold, and the next day filter if required.

ESPRIT DE SAVON. *Syn.* Spirit of Soap. Essence of do. Shaving Fluid. *Prep.* Venetian soap ½ lb.; subcarbonate of potash 1 oz.; benzoin ½ oz.; spirit of wine 1 gallon; digest for a week, or until the whole is dissolved, then filter.

II. Best soft soap ¼ lb.; boiling water 1 pint; dissolve, cool, and add oils of cinnamon, (cassia,) verbena, and neroli, of each, 4 drops; dissolved in rectified spirit of wine 1 pint; mix well, and if not perfectly transparent, filter through blotting paper.

Remarks. Instead of the above perfumes, 15 drops of essence of musk or ambergris, or 30 drops of any of the perfumed spirits, or 3 drops of attar of roses, or 6 drops of any of the aromatic essential oils, may be added, when a corresponding name is given to the preparation, as *esprit de savon de la rose,* &c.

This alcoholic solution of soap is used for shaving, and is very convenient in travelling, as a good lather may be instantly produced without the trouble of employing a soap-box.

ESPRIT DE SUAVE. *Prep.* Essences of cloves and bergamotte, of each, 1½ dr.; neroli ½ dr.; essence of musk 1 oz.; eau de rose, spirits of tuberose, and the strongest spirits of wine, of each, 1 pint; spirits of jasmin and cassia, of each, 1 quart; dissolve the essences in the spirit of wine, then add the other spirits, and when well mixed add the rose-water. A most delicious perfume.

ESPRIT DE TAIN. *Syn.* Spirits of Lemon Thyme. Spiritus Thymi. *Prep.* Tops of lemon thyme 1 lb.; proof spirit 1 gallon; distil 7 pints.

ESPRIT DE VIOLETTES. *Syn.* Spirit of Violets. Essence of do. Essence of Orris. *Prep.* I. Florentine orris root, reduced to coarse powder, ¼ lb.; rectified spirit of wine 1 pint; digest for 14 days, and strain with expression.

II. Orris (as above) 5 lbs.; rectified spirit 1 gallon; digest as before and submit the root to powerful pressure in a tincture press, to extract the last portion of the liquor; filter. Very fragrant. This may be advantageously prepared by percolation.

ESSENCE. *Syn.* Essence. Esprit, (*Fr.*) Essentia, (*Lat.*, from *esse*, to be, or exist.) That part of a substance on which its most remarkable properties depend. The term has been very generally applied to preparations of vegetables or organic substances, that contain their active principles in a concentrated form, but it is more properly restricted to the volatile oils obtained from vegetables by distillation, or to a solution of these oils in alcohol. In Pharmacy the word essence is very commonly applied to concentrated preparations that vastly differ from each other. Thus, concentrated infusions, decoctions, liquors, and tinctures are frequently called essences by the druggists, but the term "*fluid extracts*" would be more appropriate. The present article will be confined to a short notice of the principal compound essences, or those that undergo some preparation, beyond being merely extracted from vegetables by distillation along with water. The latter will be considered under the article Oils.

Prep. The concentrated preparations of the pharmaceutist, termed essences, are mostly prepared by digesting the active ingredient in rectified spirit of wine, either with or without the addi-

tion of a certain portion of water; or they are extemporaneously formed by dissolving a certain portion of the essential oil of such substances in the spirit. In this way are made the essences of lavender, of musk, and of ginger. When it is desired only to obtain the aromatic and volatile portion of the ingredients, the latter are usually first digested in the spirit for a few days, and then submitted to distillation, when the alcohol comes over fragrant, and loaded with aromatic essential oil, or other volatile matter. In this way are prepared most of the fragrant essences of the perfumer and druggist, when simple solution of the essential oils in alcohol is not resorted to. In many cases the active principles of the ingredients are partly volatile, and partly fixed, or at least do not *readily* volatilize at the temperature at which alcohol distils over. This is the case, for instance, with the active portion of cubebs and Jamaica ginger. In such cases digestion alone should be adopted. When the principles of organic substances, of which it is desired to obtain a concentrated solution, are resinous, oily, or but little soluble in weak spirit, *which is mostly the case*, the strongest rectified spirit of wine should alone be employed. In the preparation of essences, without distillation, the method by *percolation* is preferable to that of simple maceration and expression, as it is not only more economical, but a more concentrated solution may thereby be obtained. The ingredients for the preparation of essences must undergo the same operations of bruising, powdering, or slicing, as is directed under *Tinctures*, previous to digestion in the spirit, or other menstruum; and the length of time they should be allowed to infuse, when this method alone is adopted, should not be less than ten days; but this time may be advantageously extended to a fortnight, or longer. During the whole of this period frequent agitation should be employed, and when the ingredients are so bulky as to absorb the whole of the fluid, the vessel which contains the mixture should be securely fastened by a bung covered with bladder, and inverted every alternate day. By this means, the fluid will equally extract the virtue of every portion of the ingredients. In all such cases percolation is preferable. For the essences used as perfumes and flavoring, not only must the spirit be perfectly tasteless and scentless, but it must be also quite devoid of color. (See Concentrated Decoctions, Infusions, Liquors, Spirit, and Percolation.)

ESSENCE, ANODYNE. *Syn.* Essentia Anodyna. *Prep.* (Germ. Ph.) Aqueous extract of opium ℥j; spirits of cinnamon f℥ix; dissolve.

ESSENCE, ANTI-HYSTERIC. *Syn.* Ess. Anti-hysterica. *Prep.* (P. Cod.) The same as fetid spirit of ammonia.

ESSENCE, BITTER. *Syn.* Ess. Amara. *Prep.* (Ph. Den.) Wormwood 4 parts; gentian root, bitter orange peel, and blessed thistle, of each 1 part; alcohol 45 parts; digest for a week. *Dose.* ½ dr. to 2 drs., combined with mixtures. Tonic and stomachic.

ESSENCE, CEPHALIC. *Syn.* E. Cephalica. *Prep.* (Dr Ward.) The same as the compound camphor liniment, P. L.

ESSENCE D'ŒILLETS. *Prep.* Cinnamon 3 oz.; cloves 1¼ oz., (both well bruised;) rectified spirit 2 quarts; digest for a week. Oil of cloves also bears this name.

ESSENCE D'ORIENT. A pearly-looking substance, found at the base of the scales of the blay or bleak, a small fish of the genus cyprinus. It is employed in the arts for the manufacture of factitious pearls.

Prep. The scales are scraped from the fish into a tub containing water, and after agitation and repose, the fluid is poured off, and its place supplied with fresh water, and this in its turn, after agitation and repose, is also poured off. This part of the operation is repeated till the essence and scales are perfectly freed from impurities, when the whole is thrown on a sieve, which retains the latter, but allows the former to flow through. The essence is then obtained as a deposite at the bottom of the vessel.

Remarks. This substance has a bluish white and pearly aspect, and is employed to cover the interior of glass bubbles and beads, in imitation of pearls, or mother of pearl. Its tendency to putrefaction, while in the moist state, may be obviated by the addition of a little water of ammonia.

ESSENCE DE MYRTE. *Syn.* Essence of Myrtle Blossoms. *Prep.* Myrtle tops (in blossom) 1½ lb.; proof spirit 9 pints; digest 3 days, then distil 1 gallon. A pleasant perfume.

ESSENCE DE TUBEROSE. *Prep.* The flowers are stratified with sheep's or cotton wool, impregnated with the purest oil of ben or olives, in an earthen vessel, closely covered, and kept for 12 hours in a water bath; the flowers are then removed and fresh ones substituted, and this is repeated until the oil is sufficiently scented. The wool or cotton is then mixed with the purest spirit of wine, and distilled in a water bath, or else digested in a warm situation, and in a well closed vessel, for several days; during the whole of which time frequent agitation should be had recourse to. In a similar way may be made the essences of jasmine, violets, and other flowers. (See Spirit.)

ESSENCE DES VIOLETTES. (See Esprit des Violettes, and Spirit of Violets.)

ESSENCE FOR THE HEADACHE. (WARD'S.) *Prep.* Liquor of ammonia, 4 oz.; English oil of lavender ½ dr.; camphor 1 oz.; spirit of wine 1 pint; dissolve. Stimulant; rubefacient; used for local pains, as headache, colic, &c. Compound camphor liniment is usually sold for it.

ESSENCE OF ALLSPICE. *Syn.* Ess. of Pimento. Ess. Pimentæ. *Prep.* Essential oil of allspice 1 oz.; spirit of wine 1 quart; dissolve Used as a flavoring by cooks and confectioners

ESSENCE OF ALLSPICE, CONCENTRATED. Oil of allspice 1 oz.; strongest spirit of wine 1 pint; mix. As last.

ESSENCE OF AMBERGRIS. *Syn.* Ess Ambræ Griseæ. Tinctura do. *Prep.* I. Ambergris ¼ oz.; rectified spirit of wine 1 pint; cut the ambergris into small fragments, place it in a strong vessel, secure the mouth very firmly, and expose it to the heat of the sun or in an equally warm situation for 1 or 2 months, frequently shaking it during the time; lastly decant, and filter through paper.

II. To the last add a fresh emptied musk bag and proceed as before.

III. Ambergris 2 oz.; bladder musk 1 oz.; spirit of ambrette 1 gallon; as before.

IV. Ambergris ½ oz.; musk 3 drs.; lump sugar 2 drs.; grind together in a smooth Wedgwood-ware mortar, add 10 drops of oil of cloves, 20 drops of true balsam of Peru, and enough essence of jasmine or tuberose to convert it into a perfectly smooth paste; then put it into a strong bottle with 1 quart of rectified spirit of wine, observing, before adding the whole of the last, to raise the mortar out well with it, that nothing may be lost; lastly, digest for 6 or 8 weeks, as above.

Remarks. Essence of ambergris is used as a perfume, and is added in small quantities to sweet-scented spirits and wines, to improve their flavor and aroma. The last two formulæ produce remarkably fine products. A very small quantity of either of these added to lavender water, eau de Cologne, tooth-powder, hair-powder, wash-balls, or a hogshead of claret, communicates a delicious fragrance.

ESSENCE OF AMMONIACUM. *Syn.* Ess. Ammoniaci. *Prep.* I. Ammoniacum in tears 1 lb.; bruise it in a *very cold* marble mortar with half its weight of *coarse* and well-washed silicious sand or powdered glass; add gradually rectified spirit of wine ½ pint, work the whole to a smooth paste, then place it in a wide-mouthed bottle, and further add spirit of wine 1½ pints; cork down close, digest for a week with constant agitation, allow it to repose until quite settled, then pour off the supernatant transparent liquid into another bottle for use.

II. Reduce 1 lb. of gum ammoniacum to a cream with ¾ pint of boiling water, cool a little, place it in a strong bottle, and add cautiously 1¼ pint of rectified spirits of wine, *cork down close*, and macerate for a few days; lastly, place the bottle in a moderately warm situation that the sediment may subside, after which pour off the clearest portion through flannel into another bottle.

Remarks. Both the above are used as substitutes for the gum in substance, for extemporaneously preparing the milk and mixture of ammoniacum, &c. They are *said* to possess equal medicinal virtue, with the same weight of solid gum. The product of the first process, when well managed, is a beautiful pale brownish-colored transparent tincture; that of the second is milky.

ESSENCE OF AMMONIACUM, (CONCENTRATED.) The preparation usually sold under this name, and represented as *twice as strong as the gum in substance*, is generally prepared with the same quantity of ingredients as the first of the above. A stronger article may be prepared by a similar process by using 1 lb. of ammoniacum to a pint of the strongest rectified spirit. As, however, a clear liquid at this strength is somewhat difficult to produce, it is very seldom attempted by druggists; they therefore generally content themselves with sending out the liquid at half the professed strength, leaving the *label* to confer the additional concentration.

ESSENCE OF ANCHOVIES. *Prep.* I. Anchovies 7 lbs.; pulp through a fine hair or brass-wire sieve; boil the bones and portion that will not pass through in water 5 quarts; strain, add to the clear liquid the pulped fish, and salt and flour, of each 1 lb., along with red bole, or infusion of cochineal, sufficient to color, and again pass the whole through the sieve. The product will be about 20 lbs.

II. To the last add Cayenne pepper ¼ oz.; the grated peel of a lemon, and mushroom catsup, 4 oz.

III. Use British anchovies (pickled sprats) or young pilchards, along with herring liquor, or the drainings of anchovy barrels.

Use. As a sauce and condiment; when well prepared it has a fine flavor.

ESSENCE OF BITTER ALMONDS. (See Almond Flavor.)

ESSENCE OF BITTER ALMONDS, (CONCENTRATED.) *Prep.* Essential oil of almonds 2 oz.; rectified spirit of wine 1 pint; dissolve. Very powerful. (See page 49.)

ESSENCE OF CHAMOMILE. *Prep.* Essential oil of chamomile ½ oz. to 1 oz.; spirit of wine 1 pint; mix. White.

II. Gentian root, sliced or bruised, 1 lb.; dried orange peel ¼ lb.; spirit of wine 1 gallon; essential oil of chamomile 5 oz.; macerate a week. Slightly colored. Some persons use ½ lb. of quassia wood, instead of the gentian and orange peel. Both the above are stomachic and tonic.

ESSENCE OF CAMPHOR. *Syn.* Ess. Camphoræ. Do. Concentrated. *Prep.* Camphor (clean) 4½ oz.; rectified spirit of wine 1 gallon; dissolve.

Remarks. There is a large quantity of this solution of camphor sold by the wholesale druggists, who charge a considerable price for it. It is very convenient for preparing extemporaneous camphor julep or mixture. About ½ dr. added to 7½ drs. of distilled water forms 1 oz. of a transparent aqueous solution of camphor. (See Camphor Julep, p. 156.)

ESSENCE OF CAPSICUM. The same as Essence of Cayenne.

ESSENCE OF CARAWAY SEEDS. *Syn.* Ess. Carui. Concentrated Ess. of Caraways *Prep.* Essential oil of caraway 1 oz.; spirit of wine 1 pint. *Used* in dispensing, and by confectioners and cooks as a flavoring.

ESSENCE OF CARAWAY SEEDS, (double distilled.) Essential oil 2 oz.; spirit of wine 1 pint.

ESSENCE OF CAYENNE. *Syn.* Ess. Capsici. Concentrated Essence of Cayenne Pepper. *Prep.* Capsules of capsicum, bruised, 3 lbs.: rectified spirit 1 gallon; digest for 14 days, then press and filter.

Remarks. This liquid has an intensely burning taste; one drop is sufficient to deprive a person of the power of speech for several seconds. It is used as a flavoring, and for making soluble cayenne pepper; also in dispensing.

ESSENCE OF CASSIA. *Syn.* Ess. Cassiæ *Prep.* Oil of cassia 1 oz.; spirit of wine 1 pint, mix. *Used* as a flavoring, &c.

ESSENCE OF CARDAMOMS. *Syn.* Ess. Cardamomi. Do. do. concent. *Prep.* Lesser cardamom seeds 5½ lbs.; spirit of wine 1 gallon; digest for a fortnight; press and filter.

Remarks. This preparation is very convenient for flavoring cordials, pastry, &c. It is very powerful. In the druggist's laboratory it is frequently substituted for powdered cardamoms in making

compound extract of colocynth, and for this purpose has the advantage of adding no inert matter, while it imparts the characteristic odor of the seeds in a remarkable degree. When used in this way, it is added to the Extract when nearly cold and about to be taken from the pan.

Cardamom seeds are very difficult to bruise in a mortar, and seldom get perfectly crushed, even after long beating. It will be found much the best plan to grind them in a pepper-mill. The testæ should be separated from the kernels, as the former are quite inert, and if used occasion a loss of spirit for no purpose.

ESSENCE OF CELERY SEED. *Syn.* CONCENTRATED ESS. OF CELERY. *Prep.* Celery seeds, bruised, 4 oz.; proof spirit 1 pint; digest 10 days or more. *Use.* As a flavoring. It is better if prepared with rectified spirit, when double the weight of seed may be used.

ESSENCE OF CINNAMON. *Syn.* ESS. CINNAMOMI. As Essence of Cassia. Used in confectionery and cookery.

ESSENCE OF CIVETTE. *Syn.* ESS. ZIBETHI. *Prep.* I. Civette 1 oz.; spirit of wine 1 pint; as essence of musk.

II. Instead of spirit of wine use spirit of ambrette. Used as a perfume.

ESSENCE OF COLTSFOOT. *Prep.* I. Balsam of tolu 1 oz.; compound tincture of benzoin and rectified spirit of wine, of each 2 oz.; dissolve.

II. Tincture of tolu, compound tincture of benzoin, and spirit of wine, of each equal parts.

Remarks. This balsam is pectoral and stimulant. It is a *quack* remedy for consumption and most diseases of the lungs, but is more likely to kill than cure in these complaints.

ESSENCE OF CUBEBS. *Syn.* ESS. CUBEBÆ. *Prep.* Cubebs 4 lbs., (bruised, or preferably ground in a pepper-mill;) rectified spirit 1 gallon; digest 14 days, press and filter. This essence has a very large sale, and if carefully prepared from a good sample of the drug, is a most excellent preparation. It is generally called "*Concentrated Essence of Cubebs.*"

II. (Dublanc.) Oleo-resinous extract of cubebs ℥j; rectified spirit ℥iij; dissolve. This is a very active and concentrated form of administering cubebs, but must not be confounded with the preceding. The former is the one always meant when "Essence of Cubebs" is ordered.

ESSENCE OF DILL. *Syn.* ESS. ANETHI. *Prep.* I. Oil of dill (anethum) f℥j; spirit of wine f℥xix; mix; white.

II. Oil of dill, extract of dill, and salt of tartar, of each ℥ss; spirit of wine ¾ pint; digest and strain.

Remarks Both the above are aromatic and flatulent. The first is commonly used as an adjunct to other medicines, especially purgatives for children.

ESSENCE OF ERGOT. *Syn.* ESS. ERGOTÆ. ESS. SECALI CORNUTI. CONCENTRATED ESS. OF ERGOT OF RYE. *Prep.* Ergot, reduced to coarse powder by pounding, or preferably by grinding in a pepper-mill, 1 lb.; boiling distilled water 4 lbs.; mix in a close vessel, and digest with agitation until cold, then put it into a wide-mouthed bottle, and add rectified spirit 2 lbs.; macerate for a week, press and filter.

Remarks. 4 dr. of this essence are equal to 1 dr. of ergot in substance. It is 8 times the strength of the infusion, (as usually prepared according to the formula of Pereira and others,) and 2½ times the strength of the tincture of ergot of the London Apothecary's Hall.

ESSENCE OF GINGER. *Syn.* ESS. ZINGIBERIS. CONCENTRATED ESS. OF GINGER. *Prep.* I. Unbleached Jamaica ginger 4 oz., (well bruised;) rectified spirit of wine 1 pint; digest for a fortnight, press, and filter.

II. (*Oxley's concentrated Essence of Jamaica Ginger.*) The same as the preceding, with the addition of a very small quantity of essence of cayenne.

III. Bruised unbleached Jamaica ginger 12 lbs.; rectified spirit of wine 2½ gallons; digest 14 days, press, strain, and reduce the essence by *distillation* to 1 gallon; cool and filter. *Remarks.* This produces a most beautiful article. A certain metropolitan drug-house that does very extensively in this preparation, employs this form. It is at once inexpensive and easily performed, as the spirit distilled off may be used with advantage for preparing the common tincture of ginger, and several other articles; 2 oz. of this essence are regarded as equivalent to 3 oz. of the finest ginger. A single drop swallowed will almost produce suffocation.

IV. Digest 12 lbs. of ginger in 3 galls. of spirit of wine, as last, and reduce the tincture by distillation to 4 pints, then cool as quickly as possible out of contact with the air, and add, of the *strongest* rectified spirit of wine ½ a gallon; lastly, filter if required. Quality remarkably fine.

V. Ginger and animal charcoal, both in coarse powder, equal parts; add enough rectified spirits of wine to perfectly moisten them, and after 24 hours put the mass into a "percolator," return the first runnings 2 or 3 times, then change the receiver, and pour on spirit gradually as required, and at intervals, until as much essence is obtained as there was ginger employed. *Remarks.* Quality excellent. The mass remaining in the percolator may be treated with fresh spirit until exhausted, and the tincture so obtained may be advantageously employed, instead of spirit, in making more essence with fresh ginger. The last portion of spirit in the mass may be obtained by adding a little water. (See PERCOLATION.)

ESSENCE OF GUAIACUM. *Syn.* ESS. GUAIACI. CONCENTRATED ESS. OF GUAIACUM. FLUID EXTRACT OF DO. *Prep.* Guaiacum shavings, from which the dust has been sifted, 3 cwt. Exhaust the wood by boiling with water, as in preparing an extract, using as *little* of that fluid as is absolutely necessary; evaporate to exactly 1¾ gallons; let it stand until cold, stirring it all the time to prevent the deposite of resinous matter; put the whole into a bottle, add spirit of wine 5 pints; agitate repeatedly for a week, then allow it to settle for 7 or 8 days, and decant the clear into another bottle.

Remarks. This preparation is frequently substituted for guaiacum shavings in the preparation of compound decoction of sarsaparilla. 1 pint of this essence is considered equivalent to 19 lbs. of guaiacum in substance.

ESSENCE OF LEMON-PEEL. *Syn.* ESS. CORTICIS LIMONIS. QUINTESSENCE OF LEMON-RIND

Prep. I. Yellow peel of fresh lemons ½ lb.; spirit of wine 1 pint. Digest for a week, press, and filter. Very fragrant.

II. Yellow peel of fresh lemons 1 lb.; boiling water ½ gallon. Infuse 1 hour, express the liquor, boil down to ½ a pint, cool, and add essence of lemon ½ oz., dissolved in spirit of wine 1½ pints; mix well, and filter.

Remarks. The above are used by cooks and confectioners as a pleasant flavoring. Essence of orange-peel is made in the same way.

ESSENCE OF MUSK. *Syn.* Ess. Moschi. Tinctura do. *Prep.* I. Grain musk 2 oz.; boiling water 1 pint. Digest in a close vessel until cold, then add rectified spirit of wine 7 pints; carbonate of potassa ½ dr. Cork close, and digest in a matrass, in the sunshine, for 2 months, if in summer, or in winter in an equally warm situation. A water-bath may be employed to facilitate the process.

II. Substitute 1 oz. of liquor of ammonia for the carbonate of potassa in the last formula.

III. Grain musk 2 drs.; spirit of wine 2 pints; essence of ambergris 1 oz. As above.

IV. Musk from the bladder, cut small, 5 oz.; civet 1 oz.; essence of ambergris 1 pint; spirit of ambrette 1 gallon. As before.

Remarks. All the preceding formulæ yield fine essences, but the product of the last is of the very finest quality, and such as is seldom sold except by the most celebrated houses, when it fetches a very high price. It is powerfully and deliciously odorous.

ESSENCE OF MUSTARD, (WHITEHEAD'S.) *Prep.* Oil of turpentine 1 pint; camphor, oil of rosemary, and flower of mustard, of each ½ oz.; mix.

ESSENCE OF NEROLI. *Prep.* I. Neroli 2 dr.; spirit of wine 1 pint; mix. A pleasing perfume.

II. Oil of orange 2 drs.; orris root, bruised, ½ oz.; ambergris 10 grs.; neroli 15 drops; spirit of wine 1 pint; digest 14 days. Very fragrant.

ESSENCE OF NUTMEG. *Syn.* Ess. Myristicæ. Ess. Nucis Moschatæ. *Prep.* Essential oil 1 oz.; rectified spirit 1 pint; dissolve. *Use.* As a flavoring in the arts of the cook, liqueurist, and confectioner.

ESSENCE OF ORANGE, YELLOW. *Prep.* Fresh orange-peel, spirit of wine, and water, of each ½ pint. Digest for 1 week, press, filter, and add sherry wine 2 or 3 pints. A pleasant liqueur.

ESSENCE OF ORANGE PEEL, (SACCHARINE.) *Syn.* Oleo-saccharum of Orange. The yellow rind rubbed off with hard white sugar. In a similar way may be prepared essences or oleo-sacchara of every variety of lemons, citrons, oranges, &c. (See Citrons, p. 199.)

ESSENCE OF PATCHOULI. *Syn.* Spirit of Patchouli. *Prep.* Indian patchouli leaves 2 lbs.; rectified spirit of wine 9 pints; water 1 gallon. Macerate for 1 week, frequently shaking the vessel, then distil over exactly 1 gallon. A very fashionable perfume.

ESSENCE OF PENNYROYAL. *Syn.* Ess. Pulegii. Spiritus Pulegii. Spirit of Pennyroyal. *Prep.* Oil of pennyroyal 3 oz.; green spinage or parsley 1 oz.; spirit of wine 1 quart; mix. Digest until sufficiently colored, and strain. Aromatic, stimulant, emmenagogue.

ESSENCE OF PEPPERMINT. *Syn.* Ess Menthæ Piperitæ. *Prep.* Oil of peppermint 1 oz; herb peppermint ½ oz.; spirit of wine 1 pint. Digest for a week, or until sufficiently colored. Palish-green, and very strong of the peppermint.

Remarks. Essence of peppermint is not conceived to be good by the ignorant unless it has a pale tint of green, which they presume is a proof of its being genuine. The most harmless way is to steep a little of the green peppermint in the spirit for this purpose, (as above,) or if this is not at hand, a little parsley will do equally as well, and in fact improve the flavor. Some persons use spinage for the same purpose, and others add a few grains of sap green, dissolved in a spoonful of hot water. All these are quite innocent. The practice of using cupreous salts, adopted by some lazy and unprincipled makers, is unpardonable, and admits of no excuse, even a lame one, as not the least advantage, either of convenience, or cost, or appearance, results from such a practice, while the coloring matter, though small in quantity, is nevertheless sufficient to impart a noxious quality to the liquor. This fraud may be detected by the addition of liquor of ammonia in excess.

Essence of peppermint is cordial, stimulant, and stomachic. A few drops on sugar, or mixed with water, or wine, is an excellent remedy in flatulence, colic, sickness, &c. It is also used as a flavoring. *Dose.* 10 drops to a teaspoonful.

ESSENCE OF QUININE. *Syn.* Alkaline Ess. of Quinine. *Prep.* Diluted sulphuric acid 1 dr.; alcohol 1 oz.; add sulphate of quinine to saturation.

ESSENCE OF RATIFIA. *Prep.* Essential oil of almonds 1 oz.; spirit of wine 1 pint; mix. Used to make noyeau, &c. (See Almond Flavor, and Essence of Bitter Almonds.)

ESSENCE OF ROSES, (ODOROUS.) *Prep.* I. Attar of roses 1 oz.; spirit of wine 1 gallon. Mix in a close vessel, and assist the solution by placing it in a bath of hot water. As soon as the spirit gets warm, take it from the water and shake till quite cold. The next day filter. Unless the spirit of wine be of more than the common strength, it will not retain the whole of the otto in solution in very cold weather (See Esprit de la Rose.)

II. Petals of roses 3 lbs.; digest in spirit of wine 5 quarts for 24 hours; distil to dryness in a water-bath; digest the distilled spirit on 2 lbs. of fresh rose petals, as before, and repeat the whole process of maceration and distillation a third, fourth, fifth, and sixth time, or oftener, the last time only drawing over 1 gallon, which is the essence. Very fine.

ESSENCE OF ROSES, (RED.) *Syn.* Spirit of Red Roses. Tincture of do. *Prep.* Rose leaves 1 lb.; spirit of wine and water, of each 2 quarts. Digest for 14 days, press, strain, add diluted sulphuric acid 2 drs.; mix well, and the next day filter. *Use.* To make extemporaneous sirup and honey of roses, &c. Smells, colors, and tastes strongly.

ESSENCE ROYALE. *Syn.* Royal Essence. Ess. Regalis. *Prep.* (Soubeiran.) Ambergris ℈ij; musk ℈j; civet and subcarbonate of potassa, of each 10 grs.; oil of cinnamon 6 drops; oil of rhodium and otto of roses, of each 4 drops; rectified spirit of wine 4 fluid ounces. Macerate

for 10 days, or longer. Antispasmodic and aphrodisiac. A few drops on sugar, or in sirup of capillaire.

ESSENCE ROYALE POUR FAIRE LA BARBE. *Prep.* Castile soap, in shavings, 4 oz.; proof spirit 1 pint; dissolve. As ESPRIT DE SAVON.

ESSENCE OF SAVORY SPICES. *Prep.* Black pepper 2 oz.; allspice 1 oz.; nutmegs ½ oz.; cloves, cassia, coriander and caraway seeds, of each 1 drachm, (all bruised;) rectified spirit of wine 1 pint. Digest for 14 days, press, and filter. Used as a flavoring. When made with proof spirit, and only ½ the above weight of spice, it is called "TINCTURE OF SAVORY SPICES."

ESSENCE OF SOUP HERBS, (KITCHINER'S.) *Syn.* SPIRIT OF SOUP HERBS. CONCENTRATED TINCTURE OF DO. *Prep.* Lemon thyme, winter savory, sweet marjoram, and sweet basil, of each 1 oz.; lemon-peel, grated, and shalotes, of each ½ oz.; bruised celery seed ¼ oz.; proof spirit 1 pint. Digest for 10 days, or a fortnight. A superior flavoring essence for soups, gravies, &c.

ESSENCE OF SOAP. *Syn.* ESS. SAPONIS. *Prep.* (P. Cod.) White soap ℥iij; carbonate of potassa ʒj; proof spirit ℥xij. Dissolve and filter.

ESSENCE OF SMOKE. *Syn.* ESS. FULIGINIS. SMOKING FLUID, &c. Rough pyroligneous acid. Used to impart a smoky flavor to meat and fish, by washing it over them, or immersing them in it for 2 or 3 minutes.

ESSENCE OF SPEARMINT. *Syn.* ESS. MENTHÆ VIRIDIS. ESS. MENTHÆ SATIVÆ. *Prep.* 1 oz. of essential oil to 1 pint of spirit of wine, tinged green. Process, use, and dose, the same as Essence of Peppermint.

ESSENCE OF SPRATS. *Syn.* SOLID ESSENCE OF SPRATS. EXTRACT OF DO. *Prep.* Essence of anchovies (made with sprats) 7 lbs.; add wheat flour to thicken to the consistence of cream, then gently evaporate to a stiff paste. Sold for solid essence of anchovies.

ESSENCE OF SPRUCE. *Syn.* ESS. ABIETIS. This is prepared by boiling the twigs of the spruce or Scotch fir in water, and evaporating the decoction. It is stimulant and tonic. Used to make spruce beer.

ESSENCE OF TURTLE. *Prep.* Essence of anchovies and shallot wine, of each 3 oz.; basil wine ½ pint; mushroom ketchup ¼ pint; the juice of 2 lemons; the *yellow* peel of 1 lemon; curry powder ¼ oz. Digest for 1 week. *Use.* To impart the flavor of turtle to soups and gravies.

ESSENCE OF VANILLA. *Prep.* I. Vanilla, cut small, 1 lb.; spirit of wine ½ gallon. As Essence of Musk.

II. Vanilla (best) ¾ lb.; spirit of ambrette 1 quart; cloves 30 grs.; grain musk 7 grs. As last. Very superior. Used as a perfume and flavoring.

ESSENCE OF WORMWOOD. *Syn.* ESS. ABSINTHII. *Prep.* (Van Mons.) Salt of wormwood ʒv; extract of wormwood ʒj; tincture of wormwood 1 pint. Digest and filter.

ESSENCES FOR KITCHEN USE. *Syn.* CULINARY ESSENCES. FLAVORING DO. SPICE DO. ESSENCES FOR THE TABLE. The principal of these are the *Essences of Allspice, Cassia, Celery, Cinnamon, Cloves, Mace, Marjoram, Nutmegs, Ginger, Cayenne, Garlic, Lemon-peel, Orange-peel, Peppermint, Spearmint, Caraway seeds Cardamom seeds, Coriander seeds, &c., &c.;* the whole of which are generally made by either dissolving ½ oz. of the essential oil of the spice in a pint of rectified spirit of wine, or by macerating 4 oz. of the bruised spice in a like quantity of the same fluid for a week. When made with only ½ or ¼ the above quantity of spice or flavoring, and with proof spirit, or brandy, instead of spirit of wine, they are commonly called "*Culinary Tinctures,*" or "*Tinctures for Kitchen Use.*" The whole of these are employed to flavor gravies, soups, pastry, mulled wine, &c. See also CONCENTRATED ESSENCES, before described.

ESSENTIA BINÆ. (Literally, *Essence of Malt.*) The brewer's name for coloring, or burnt sugar. (See COLORING.)

ESSENTIA ODORIFERA. *Prep.* I. Grain musk and balsam of Peru, of each 11 grs.; civet and oil of cloves, of each 5 grs.; oil of rhodium 2 grs.; salt of tartar 30 grs.; alcohol 2 oz. Macerate for 14 days, then pour off the clear. A beautiful perfume.

II. Oil of rhodium and balsam of Peru, of each ½ dr.; oil of cloves 1 dr.; spirit of ammonia ¼ oz.; essence of civet 2 oz.; essence of musk 5 oz.; neroli, oils of lavender, verbena, and cassia, of each 5 drops. Mix, dissolve, and filter. Very fine

ESSENTIAL SALT OF BARK. Extract of Peruvian bark, prepared with cold water, and evaporated by a gentle heat.

ESSENTIAL SALT OF LEMONS. The preparation sold under this name is made by mixing cream of tartar (bitartrate of potassa) with twice its weight of salt of sorrel, (binoxalate of potassa,) both in fine powder. It is used to remove fruit stains from linen, by rubbing a little of it on the part moistened with warm water. It is poisonous.

ETCHING. A species of engraving, in which the design is formed on the plate by the action of an acid, or some other fluid, instead of the graver.

Proc. The plate is covered with a ground or varnish capable of resisting the action of the etching fluid, the design is next scratched on the metal by means of a species of needle or pointed tool of steel. A border of wax is then placed round the plate, and the "biting" menstruum poured on, and allowed to remain till the lights or finest portion of the design is sufficiently "bit in." The etching fluid is then poured off, the plate washed, and the light parts "stopped up" with wax or varnish, when the solvent is again poured on, and allowed to remain until the finest portion of the exposed lines are sufficiently deep, when the acid is again poured off, and the whole process is repeated till the very darkest lines or shadows are sufficiently formed. The plate is then cleaned, and is printed from in the same way as a common engraved copper-plate. The most approved way of laying the design on the etching ground, is first to draw it with a black-lead pencil on paper, then to damp the paper, place it with the design next the wax or varnish, and to pass the whole through a rolling-press, by which means the picture will be transferred from the paper to the ground.

There are several varieties of etching, among which may be named *etching with a dry point,* performed entirely with the point, without any

ground, the burr being removed with the scraper; *etching with a soft ground*, when a coating of lard or tallow is employed, and the design is drawn on a piece of paper, laid evenly on the ground, by which means the fatty matter adheres to the paper, on the parts pressed on by the pencil, and the copper beneath becomes exposed. This method is employed to produce imitations of chalk or pencil drawings. *Stippling*, or executing the design in dots instead of lines. *Aquatinta*, in which a weak spirituous solution of gum mastich is poured over the plate, placed in a slanting direction, by which a granulated surface is formed, and small interstices left, exposing the naked metal: a wall of wax is next placed round the margin of the plate, the etching fluid poured on, and the lighter parts successively "stopped out" until the design is completed. *Aquatinta* etchings bear a great resemblance to Indian ink drawings. The fineness or coarseness of the grain depends entirely upon the quantity of matter dissolved in the spirit employed to form the ground.

The fluids employed for "biting" in the designs vary considerably; almost every etcher having his own receipt. Aquafortis, more or less diluted, is, however, generally employed for copper, and this, with the addition of pyroligneous acid, for etching on steel; but any fluid that will rapidly dissolve the metal may be used for this purpose. The *etching varnish* or ground may be formed of any substance capable of resisting the action of the etching fluid, and, at the same time, sufficiently soft to allow of the free use of the needle or point, and sufficiently solid to prevent an injury to the design during the "scratching in." (See FLUIDS and VARNISHES.)

In etching on glass, the ground is laid on, and the design scratched out in the usual way, when liquid hydrofluoric acid is applied, or the glass is exposed to the action of hydrofluoric acid gas. The former renders the surface of the etching *transparent*, the latter *opaque*. A very simple way of performing this operation is to wet the design with sulphuric acid, and then to sprinkle on some finely-pulverized fluor spar, (fluoride of calcium,) by which means hydrofluoric acid is set free and attacks the glass. This may be very easily applied to the graduation of glass vessels, thermometer tubes, &c.

A most rapid method of etching on iron or steel, capable of very general application, is as follows: Warm the metal until it is capable of melting a piece of beeswax, or etching varnish, which must then be carefully rubbed over it, so as to form a thin and even coating; allow the whole to cool, and scratch out the design in the common way, with a needle or point; then sprinkle on a little powdered iodine, and at the same time add a few drops of water with a camel-hair pencil, and work them into a liquid paste, which must be moved about over the intended engraving, for a period varying from one to five minutes, according to the depth of lines required to be produced. Afterwards wash the whole in clean water. Persons acquainted with the properties of iodine will readily perceive that the same etching-paste, by being kept for a few days, will again acquire the property of dissolving iron. I have thus successfully employed the same materials three or four times. Iodine will, doubtless, at no very distant period, supersede the use of acids for the above purpose, on account of its portability and convenience. To travellers and amateurs who amuse themselves with the delightful art of etching, it will, I think, prove invaluable. [I published this method of etching some two or three years since, and have since adopted it with considerable success.]

ETHAL, (from *eth* and *al*, the first syllables of ether and alcohol, from its composition resembling those liquids.) A substance discovered by Chevreul, and formed during the saponification of spermaceti.

ETHER. *Syn.* SULPHURIC ETHER. OXIDE OF ETHULE. ETHER, (*Fr.*) ÆTHER, (*Lat.*) ÆTHER VITRIOLICUS, (P. L. 1788.) ÆTHER RECTIFICATUS, (P. L. 1809 and 1824.) ÆTHER SULPHURICUS, (P. L.) VITRIOLIC NAPHTHA. NAPHTHA VINI. (From αιθης, pure air, or any highly subtile fluid.) In CHEMISTRY, a volatile, fragrant, inflammable, and intoxicating liquid, obtained by distilling a mixture of sulphuric acid and alcohol.

Hist. Ether, in combination with alcohol, is said to have been known to Raymond Lully in the 13th, and to Basil Valentine in the 15th century; but the precise directions for its preparation were first published by Valerius Cordus in 1544, by whom it was called *Oleum Vitrioli dulce*. The term *ether* was first employed by Frobenus about the year 1730. It is only within the present century that ether has been obtained in a state of *absolute purity*.

Principles of etherification. When a mixture of alcohol and sulphuric acid is heated to a certain temperature, a series of complicated changes ensue, among which is the conversion of the former into ether, which passes over along with some water and undecomposed alcohol, and condenses in the receiver. According to Liebig, ether is the oxide of a hypothetical radical called "*ethule*;" and alcohol is the hydrate of this oxide. On the admixture of sulphuric acid and alcohol, a hydrated bisulphate of ether (oxide of ethule) is formed, and this is subsequently decomposed by heat into ether, water, and sulphuric acid. "If we consider each particle of the hydrated bisulphate of oxide of ethule, as composed of ether, (oxide of ethule,) anhydrous sulphuric acid, and water, it is clear that the anhydrous acid, at the moment of its separation from the ether, must seize on all water, free or combined, in the vicinity of the ether. Thus, at the moment the ether becomes free, the anhydrous acid, also set free, prevents it from uniting with water to form alcohol. But when the gaseous ether passes through the undecomposed hydrated bisulphate of oxide of ethule, a certain portion of the water of that compound must evaporate in the dry gas; and under these circumstances the ether and water do not combine together. The surface of the effervescing liquid has the temperature at which the hydrated bisulphate of oxide of ethule is decomposed; but at this temperature (284°) the water of that compound is gaseous. There are thus produced simultaneously,—water, in the gaseous form, and ether, also gaseous, by decomposition; which, as both are in the nascent state, unite to form alcohol. Thus, the alcohol, always observed to distil over with the ether, is derived from the *surface;* and the ether and water which distil over, proceed from the decomposition in the

interior of the liquid. This explains why no ether is obtained, when the liquid is not in a state of *brisk ebullition*, no matter how *high* the temperature may be; it explains further why more alcohol is obtained when a current of dry air passes through the liquid; as, in that case, the same decomposition goes on in the interior of the liquid as generally occurs at the surface." (Liebig.)

According to the opinion of some, ether is the first hydrate of olefiant gas, and alcohol the second; and the conversion of the latter into the former consists in the mere abstraction of the second equivalent of water. This hypothesis has been principally held in France, and the former in Germany; and the elaborate investigations into the composition of ethereal compounds, induced by these conflicting opinions during nearly a dozen years, has led to the enrichment of organic chemistry with a multitude of new compounds and new facts, which might otherwise have been lost to science. These opposite opinions are, however, essentially the same; and, as it has been justly observed by Liebig, "men disputed about them because they were not agreed on the interpretation of phenomena."

A similar opinion to the preceding, is that ether is the hydrate of a quadrihydrocarbon, to which the name ETHERIN has been given. The late Mr. Hennel, of Apothecaries' Hall, held this view. He considered that in the conversion of alcohol into ether, a compound of sulphuric acid and etherin (sulphovinic acid) is first formed with part of the alcohol, and that during the ebullition this compound is decomposed; its dihydrate of carbon uniting with the remaining alcohol to form ether, which distils over, mixed with undecomposed alcohol and water.

Thus ether has been regarded by different authorities as a *a dihydrate of olefiant gas*; a *hydrate of etherin*; and as an *oxide of ethule*, or *ethereum*; but it must appear to an impartial observer that these opinions do not so greatly differ, as their advocates have represented; and if, as suggested by Kane and Malaguti, *acetule* be taken as the hypothetical radical of the series, this will be very evident, as may be seen by mere inspection of the following table:

Acetule $= C_4H_3$ unknown.
Olefiant gas $= C_4H_3 + H$
Ethule $= C_4H_3 + H_2 =$ unknown.
Ether $= C_4H_3H_2 + O =$ oxide of ethule.
Chloride of ethule.
$= C_4H_3H_2 + Cl =$ chloric ether.
Iodide of ethule . . .
$= C_4H_3H_2 + I =$ hydriodic do.
Acetate of oxide of ethule
$= C_4H_3H_2O + \bar{A} =$ acetic do.

From the above table the formation of other compounds of ethule may be readily explained, by mere substitution, which view is supported by the actual constitution of the ethers, according to the most correct analysis.

During the distillation of a mixture of sulphuric acid and alcohol, the relative proportions of the ingredients are constantly varying, occasioned by the decomposition of the alcohol, and evaporation of the newly-formed ether and undecomposed alcohol, by which means the relative quantity of sulphuric acid increases, the boiling point rises, and new reactions take place. Olefiant gas, sulphurous acid, water, carbon, and other products are formed, some of which pass over into the receiver. The distillation of ether is, however, usually stopped before this point is arrived at.

According to theory, 2 equivalents, or 46 parts of absolute alcohol, should produce 1 eq., or 37 parts of pure ether, but in practice no such product can ever be obtained. The greatest product, by operating according to Boullay's method, which produces more ether than any other, does not exceed 33½ parts for the preceding quantity of alcohol, or 71·5%. (Geiger.)

Prep. There are only two methods employed for the preparation of ether, viz. I. By mixing the whole of the ingredients at once, and immediately subjecting them to distillation. II. By adding the alcohol in a slender streamlet to the acid, previously raised to the etherifying temperature. The former, though less economical, is the one more generally employed. "Ether is also formed by the decomposition of the bisulphate, biphosphate, and biarseniate of oxide of ethule, (sulphovinic, phosphovinic, and arseniovinic acids,) and by the action of fluoride of boron, chloride of zinc, chloride of tin, and other chlorides on alcohol." (Liebig.)

I. *a.* (*Process of the L. Ph.*) Rectified spirit ℔. iij; sulphuric acid ℔. ij; carbonate of potassa, previously ignited, ℥j; pour ℔. ij of the spirit into a glass retort, add the acid, place it on a sand-bath, so that the liquor may boil as quickly as possible, and the ether pass into a receiver cooled by ice or water; and distil until a heavier fluid begin to pass over. Then lower the heat, add the remainder of the spirit, and distil as before. Mix the distilled liquors together, pour off the supernatant portion, add the carbonate of potassa, and agitate occasionally for one hour; finally, distil the ether from a *large* retort, and keep it in a well-stoppered bottle.

b. (*Liebig.*) Mix 5 parts of alcohol of 90% with 9 parts of oil of vitriol, in a vessel of copper or iron, immersed in cold water; introduce the mixture into a still, connect it with a refrigerator, and a well-cooled receiver, and raise it to a state of ebullition as rapidly as possible. Next add to the liquid in the still a fresh quantity of alcohol, equal in bulk to the liquid distilled over, and repeat the operation. To the distilled liquid, add as much concentrated alcoholic solution of potassa as will give it a perceptible alkaline reaction, then rectify it by distillation in a water-bath as long as the ether, which distils over, has a sp. gr. of 0·720 to 0·725 at 80° Fahr. Instead of the potassa, a little milk of lime may be used, along with its own bulk of water, rectifying the ether as before. By allowing the product to stand for some days over chloride of calcium or quicklime, and again rectifying along with one of these substances, *perfectly pure ether* will be obtained.

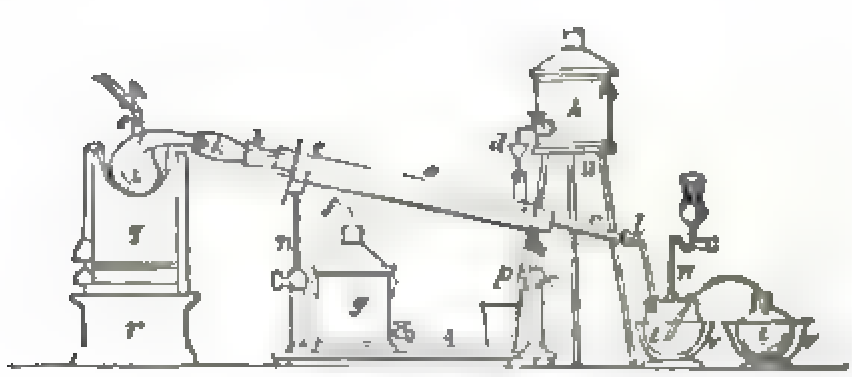
II. *a.* (*Process of the Edinburgh Ph.*) Rectified spirit f℥L; sulphuric acid f℥x; pour f℥xij of the spirit gently over the acid contained in an open vessel, mix well; transfer the mixture *immediately* into a glass matrass connected with a refrigeratory, and raise the heat *quickly* to about 280°. As soon as ether begins to distil over, supply fresh spirit through a tube into the matrass, in

a continued stream, and in such quantity as to equal that of the fluid which distils over This is best done by connecting one end of the tube with a graduated vessel containing the spirit, passing the other end through a cork fitted into the matrass, and having a stopcock on the tube, to regulate the discharge. When f℥xlij have distilled over, and the whole spirit has been added, the process may be stopped. Agitate the product with f℥xvj of a saturated solution of muriate of lime, containing ℥ss of lime recently slaked, pour off the supernatant liquor, and distil it with a very gentle heat, so long as the liquor which passes over has a density not above ·735. More ether of the same strength is then to be obtained from the solution of muriate of lime. From the residuum of both distillations a weaker ether may be obtained in a small quantity, which must be rectified by gently distilling it again. *Remarks.* This process is a mere modification of that first pointed out by Boullay, and which has since been described and recommended by Mitscherlich, Liebig, and others.

β. (*Process employed at Apothecaries' Hall.*) The apparatus consists of a leaden still, having a pewter head, and connected by means of about 6 feet of tin pipe, with a powerful worm condenser, surrounded by a constant stream of cold water, and which is connected with pewter receivers, furnished with glass lids. The still is heated with a coil of lead pipe supplied with high pressure steam, and the alcohol is supplied to the acid as required, by means of a small pipe entering the upper part of the still.

γ. (*Process of Boullay.*) Three parts of the strongest oil of vitriol are mixed with sufficient alcohol to reduce its sp. gr. to 1·780, (about 2 parts of alcohol of ·830,) which may be easily regulated by distilling off some of the ether, if required. The still or retort is then connected with a vessel full of alcohol, of 90§, by means of a small syphon furnished with a stopcock; the longer limb of the syphon, which should be of glass, being so arranged that it just dips into the mixture of acid and alcohol. Heat is next applied, and the contents of the still raised to the boiling point as rapidly as possible, and as soon as full ebullition commences, the stopcock of the syphon is turned, so as to allow the alcohol to flow down in such a manner as to keep the boiling liquid exactly at the same level; or, in other words, to supply a quantity of alcohol exactly equal to that of the liquid which distils over. By careful manipulation the whole of the alcohol which enters the retort will pass over as ether and water, and this decomposition proceeds for some time, and would continue for an unlimited period, but that the sulphuric acid ultimately becomes too weak to form ether, from the gradual absorption of the superfluous water contained in the alcohol. Were it convenient or practicable to use absolute alcohol, a given weight of sulphuric acid, of the proper strength, would maintain the power of producing ether for an indefinite period. In practice, the quantity of alcohol that may thus be etherefied is twice or thrice as much as by the common process, while neither sulphurous acid, sulphovinic acid, (Geiger,) nor sweet oil of wine is generated, and the residual liquid of the distillation continues limpid, and has only a pale brown color A mixture of 9 parts of oil of vitriol and 5 parts of alcohol of 90§, ceases to produce ether, after 31 parts of such alcohol have been added. Sulphuric acid containing more than 4½ atoms of water to 1 atom of dry acid, is too weak for the etherification of alcohol, and 3½ to 4 atoms of water appears to be the limit of dilution, fixed by experience, for the productive preparation of ether. (Liebig.)

Remarks. The mixture of alcohol with strong oil of vitriol requires some caution. It may be best done by introducing the alcohol into a suitable vessel, and imparting to it a rapid whirling motion, by which a considerable conical cavity will be formed in the centre, and into which the acid may be gradually poured with perfect safety. The mixed fluids should be brought to a state of rapid ebullition as quickly as possible, as without this precaution much of the alcohol will distil over before the liquor acquires the proper temperature for etherification. On the small scale, a tubulated retort, connected with a Liebig's condensing tube, and two globular receivers surrounded with a freezing mixture, or very cold water, may be employed as the distillatory apparatus. The second receiver should be connected with the first by means of a bent glass tube, reaching nearly to the bottom of the latter; and the whole of the joints should be securely luted as soon as the expanded air has been allowed to escape. The following convenient little apparatus has been employed by the writer for the preparation of small quantities of ether, and will be found very suitable for the distillation of most volatile fluids.



a, Condenser tube, japanned zinc 28 inches long; *b. c*, glass tube, 30 inches long, *d*, funnel by which cold water runs in from the water bottle, *h*; *e*, pipe by which water escapes through *f* into the bottle *g*; *i*, retort; *k*, adapter connecting the retort with the condenser, *l*, adapter, connecting the condenser with the bottles, *t. t.* *A*, Black wooden trussel, with moveable arms, *n*, *o*, for supporting and adjusting the height of the condenser; *B*, black wooden stool for supporting the water bottle, (the legs unscrew for travelling.) *q*, furnace, *r*, support for the furnace; *p*, gutter for carrying off water that overflows the funnel *d*, and preventing its escape along the pipe *c*; *s*. leg of syphon connected with bottle containing alcohol; *t*, *t*, glass globes, placed in the basins *v*, *v*, and surrounded with ice-cold water; *w*, safety tube containing a little mercury at *x*.

This apparatus may be purchased of Messrs. Griffin and Co., or their agents, at a very reasonable price. By connecting the neck of a flask or digester containing volatile fluids with the *lower* instead of the *upper* end of the refrigerator, ebullition may be carried on without loss, as the volatilized fluid will be condensed, and run back into the vessel from which it had just distilled. This arrangement will be found useful for boiling mixtures of alcohol and organic acids, described further on, or for any similar purpose. (See ETHERS, ORGANIC.)

For the *rectification* of ether a water-bath should be employed, and the neck of the retort may be advantageously connected with the above simple refrigerator, and the receivers should be surrounded by freezing mixtures.

Pres. Ether rapidly evaporates at common temperatures when kept in *corked* bottles, and even in bottles secured with ground-glass stoppers and tightly tied over with bladder and leather; it also becomes sour by age. To prevent this waste, the stoppers should fit very accurately, and the bottles should be placed in as cool a situation as possible.

Bottles furnished with ground-glass caps (see engraving) as well as stoppers, are frequently employed. Dewar's ether vial is formed on a similar principle. The shoulder is surrounded with a circular rim not rising quite so high as the mouth of the bottle, and a capsule similar to the one in the engraving is inverted and fitted into it. Mercury is then poured into the rim, and hermetically closes it. I have seen bottles of ether accurately stoppered, tied over with bladder and waxed, which have yet become quite empty by a voyage to the tropics, though they still appeared to be as firmly secured as when they were first put up.

Prop., &c. Pure ether is a colorless, transparent, and very limpid fluid, having a penetrating and agreeable smell, and a taste at first burning and sweetish, followed by a sensation of coolness. Its specific gravity has been variously stated. According to Liebig and Gregory it is 0·7119 at 75°; 0·7154 at 68°; and 0·7237 at 55° Fahr. Others state it to be 0·713 to 0·715 at 60°, (Ure, &c.;) or 0·713 at 68°, (Dumas, Boullay.) It is said to begin to crystallize in brilliant white plates when cooled to —24° F., and at —46° or —47° it becomes a white crystalline mass, (Ure, Liebig, Fourcroy, Vauquelin,) but, according to others, absolutely pure ether cannot be solidified by any degree of cold that can be produced, (Thenard and Bussy.) It remained fluid when placed in contact with solid carbonic acid, at a temperature of about —148° Fahr., (Pereira.) It boils at 96° or 97° Fahr.; is very combustible, is soluble in 10 parts of distilled water, and mixes with alcohol in all proportions. It abstracts corrosive sublimate, terchloride of gold, and sesquichloride of iron from their watery solutions. It readily dissolves the volatile and fixed oils, most fatty matters, as well as sulphur and phosphorus, in small quantities. By exposure to light and air it absorbs oxygen, and water and acetic acid are formed.

Ether may be recognised by its volatility, odor, taste, sparing solubility in water, admixture with alcohol in all proportions; its inflammability, burning with a yellowish white flame, and by its power of dissolving fats and resins.

Pur. The ether of the shops, generally, contains alcohol, water, or acetic acid, and sometimes all of them. Its usual specific gravity fluctuates between ·733 and ·765. The London College states that it should be ·750, while the Edinburgh College fixes it at ·735 or under. "It totally evaporizes in the air, and slightly reddens litmus." (P. L.) Pure ether should, however, be *neutral* to test paper. "When shaken in a minim measure with half its volume of *concentrated* solution of muriate of lime, its volume is not lessened." (P. E.) Ten fluid ounces of water should only dissolve one fluid ounce of ether, and should remain transparent.

Uses, &c. Ether is powerfully stimulant, narcotic, and antispasmodic, and externally refrigerant, and is used in various diseases. Applied to the forehead by means of the fingers or a strip of linen, it will generally relieve nervous headache. In pharmacy it is employed in the preparation of several tinctures, alkaloids, spirits, &c.; and in chemistry is frequently used in organic analyses. It is also employed as a solvent of resins, Indian rubber, &c., in the preparation of varnishes, and for several other useful purposes. *Dose.* 20 drops to f ʒij in water or wine. Excessive doses of ether produce intoxication resembling that from alcohol, and require similar antidotes. It is commonly taken as a stimulant by *fashionable* ladies, and though generally disguised by Cologne water, may be often distinguished in the breath of persons belonging to the higher ranks of society.

Caution. The vapor of ether is very inflammable, and when mixed with atmospheric air it forms a violently explosive mixture. The density of this vapor is 2·586, that of air being 1, (Gay Lussac;) hence it rapidly sinks, and frequently accumulates in the lower parts of buildings, especially cellars which are badly ventilated. Every crack, every joint in the floors of rooms, the space beneath doors, &c., offer a road for the passage of this vapor, which, though invisible, as surely runs out of every orifice and finds its level, as a stream of water would do. The only remedy is *thorough ventilation.* Many serious accidents have arisen from this cause, for no sooner is a light carried into an apartment where such vapor is present, than an explosion takes place. In this respect the vapor of ether resembles fire-damp and light gas. A late extensive fire in Upper Thames-street arose from a small bottle of ether being broken in the operation of packing. I have heard Dr. Reid particularly call attention to this point at his lectures; and Dr. Pereira, in his excellent work on Materia Medica, mentions the case of an apothecary at Bern, whose house was blown up in consequence of a lighted candle being taken into the cellar, in which a bottle of ether had been broken.

ETHER, ACETIC. *Syn.* ACETATE OF OXIDE OF ETHULE. PYROLIGNEOUS ETHER. ÆTHER ACETICUS. A compound of acetic acid and ether, discovered by the Count de Lauraguais in 1759. (Thomson.) *Prep.* I. (Liebig.) *a.* Dry acetate of lead 32 parts; alcohol 9 parts; oil of vitriol 12 parts; mix and distil.

β. Crystallized acetate of soda 10 parts; oil of vitriol 15 parts; alcohol of 80 or 85%, 6 parts; as before.

II. (Ure.) *a.* Acetate of lead 40 parts; alcohol 20 parts; concentrated sulphuric acid 23 parts; as before.

β. Anhydrous acetate of lead 16 parts; sulphuric acid 5 parts; absolute alcohol (or its equivalent in alcohol of 80 or 85%) 4½ parts; as before.

III. Acetate of potassa 3 parts, (or an equivalent proportion of acetate of soda;) alcohol of 85%, 3 parts; strong oil of vitriol 2 parts; as before. An economical process.

IV. (P. Cod.) Rectified spirit ℥xxx; acetic acid f℥xx; sulphuric acid ℥vj ʒij; distil ℥xl; agitate with carbonate of potash and redistil.

Remarks. The distillation should be conducted in a glass retort, or earthenware still, connected with a well-cooled receiver, and the product should be rectified along with chloride of calcium to absorb the water, and slaked lime to remove the acid, (Liebig;) or the distilled liquid may be agitated along with a *weak* lye of potassa, and after repose the supernatant ether may be decanted and rectified along with magnesia and powdered charcoal. (Ure.) The rectified acetic ether will be equal in weight to the alcohol employed. (Liebig.)

Prop. Acetic ether is colorless, and bears a considerable resemblance to ether, (sulphuric ether,) but has a much more agreeable and refreshing odor. It boils at 165°, (Liebig —166° Ure;) has a sp. gr. of 0·89 at 60° Fahr., (Liebig —0·866 at 45° Fahr., Ure;) dissolves in 7 parts of water, (Liebig, —8 parts, Ure;) and mixes in all proportions with alcohol and ether. It is decomposed by alkalis and oil of vitriol. According to the acetule-theory this ether is properly an acetate of ether, (oxide of ethule,) and may consequently be regarded as a salt of acetic acid.

Uses. Acetic ether is diaphoretic, stimulant, antispasmodic and narcotic, and has been given in doses of fʒss to fʒij, in similar cases to those in which sulphuric ether is employed. Its principal consumption is in the manufacture of British brandy.

ETHER, BENZOIC. *Syn.* Benzoate of Ether. Benzoate of Oxide of Ethule. A colorless oily liquid, having an aromatic odor and taste, and a sp. gr. slightly exceeding that of water. It boils at 410° Fahr., and is miscible with alcohol and ether. It was discovered by Scheele.

Prep. Alcohol of ·830, 4 parts; crystals of benzoic acid 2 parts; concentrated muriatic acid 1 part; mix, distil, and as soon as the product turns milky when mixed with water, change the receiver and collect the liquid that distils over. To the product add water, separate the supernatant ether, boil with water and a little oxide of lead, (to separate benzoic acid,) and lastly, free it from water by allowing it to stand over chloride of calcium. (Liebig.) See Ethers, organic.

ETHER, CARBONIC. *Syn.* Carbonate of Ether. Carbonate of Oxide of Ethule. Æther Carbonicus. An ethereal liquid, discovered by Ettling, and somewhat resembling oxalic ether.

Prep. Add gradually, fragments of potassium to oxalic ether, gently warmed, as long as bubbles of gas are formed; remove the excess of metal from the semisolid mass, add water and distil. The carbonic ether will float on the surface of the liquid in the receiver, and must be collected, dried by contact with chloride of calcium, and rectified along with some potassium or sodium, till it ceases to yield acetate of potassa when acted on by caustic potassa. (Liebig.)

ETHER, CHLORIC. *Syn.* Chloride of Ethule. Chlorhydric Ether. Hydrochloric do. Muriatic do. Marine do. Æther Muriaticus. Do. Chloricus. Do. Hydrochloricus. *Prep.* I. (P. Cod.) Alcohol and muriatic acid equal parts by weight; distil by a gentle heat, into a series of receivers, the first of which should contain a little *warm* water, and the others should be surrounded with ice.

II. (*Medicinal Chloric Ether.*) This is usually prepared by putting dry chloride of lime into a glass or earthenware retort, with just enough alcohol to moisten and cover it, and distilling by a gentle heat into a receiver, surrounded with ice or a freezing mixture.

III. (*Pure.*) Saturate alcohol with muriatic acid gas, carefully distil, purify the product from alcohol and water by means of chloride of calcium, and preserve it in *inverted* stoppered bottles, in a cool place.

Remarks. Chloric ether requires the same care in its distillation as sulphuric ether, previously described, and the same apparatus may be advantageously employed. It has a penetrating, garlic-like smell, a sp. gr. of ·874 at 40°, dissolves in 24 parts of water, is neutral, boils at 51°, and burns with a greenish flame and the production of muriatic acid. Its physiological action is similar to the other ethers. It has been given in dyspepsia, hepatic diseases, hectic fever, &c., in doses of fʒss to fʒiij. The *spiritus salis dulcis* (P. E. 1735) was a mixture of this ether and alcohol, but Geblen first brought it into notice in 1804. (Thomson.) It is but little employed in England, judging from the demand for it; a very large metropolitan drug-house having only sold about 16 ounces in the last twelve months.

ETHER, CHLORO-CARBONIC. Dumas has given this name to a peculiar liquid formed by saturating absolute alcohol with chloro-carbonic acid, (phosgene gas.) The lower stratum that forms is the ether. It must be purified by standing over oxide of lead and muriate of lime, and by subsequent rectification. It has a disagreeable smell, is heavier than water, and boils at 200° Fahr. It is decomposed by water.

ETHER, CYANIC. *Syn.* Bicyanurate of Ether. Do. of Oxide of Ethule. Æther Cyanicus. *Prep.* Saturate a mixture of alcohol and ether with hydrated cyanic acid, in vapor. In 24 hours collect the crystals, and purify by solution and crystallization in *hot* alcohol or water. Tasteless, inodorous, colorless, transparent needles and prisms. (Wöhler and Liebig.)

ETHER, HYDRIODIC. *Syn.* Iodide of Ethule. A colorless liquid, discovered by Gay Lussac, and obtained by saturating alcohol with hydriodic acid and distilling. It is about as dense as oil of vitriol, has an ethereal smell, and boils at 150° to 160° Fahr.

ETHER, HYDROBROMIC. *Syn.* Bromide of Ethule. A volatile ethereal liquid discovered by Serullas. It is prepared by dissolving 8 parts of bromine in 32 parts of alcohol, adding one part of phosphorus, and distilling the mixture by a gentle

heat as soon as it becomes cold. The ether is separated from the distilled liquid by the addition of water; it is heavier than the latter.

ETHER, HYDROTELLURIC. This may be prepared by distilling the mixed aqueous solutions of sulphovinate of baryta and telluret of sodium. The latter is prepared by calcining tellurium, or telluret of bismuth with carbonate of soda and charcoal, and must be used as soon as made. Hydrotelluric ether has a yellowish red color, like bromine, and is heavier than water. (Wöhler.)

ETHER, METHYLIC. *Syn.* HYDRATE OF METHYLENE. A colorless gas, prepared by distilling a mixture of equal measures of oil of vitriol and pyroxilic spirit.

ETHER, MURIATIC, (HEAVY.) A name given to a liquid obtained by Scheele, by distilling a mixture of oil of vitriol, peroxide of manganese, chloride of sodium and alcohol. It is more conveniently prepared by saturating alcohol of 80 to 85§, in the cold, with chlorine, adding water, collecting the oily fluid that separates, and washing it with water as long as any of it is dissolved. This fluid boils at about 245° Fahr., and is heavier than water. This ether enters into the composition of the spiritus muriatico-ethereus, a remedy occasionally used on the Continent. (Liebig.)

ETHER, NITROUS. *Syn.* HYPONITROUS ETHER. HYPONITRITE OF OXIDE OF ETHULE. DO. OF ETHER. It is said that sweet spirit of nitre was known to Raymond Lully in the 13th century, and that Basil Valentine, in the 15th century, taught an improved method of preparing it, (Dulk, quoted by Dr. Pereira;) but nitric ether was first mentioned by Kunckel in 1681. (Thomson.)

Prep. I. (*Process of the Edinburgh Ph.*) Rectified spirit 1 quart, and f℥vj; pure nitric acid of 1·500 f℥vij; put ℥xv of the spirit into a quart matrass, fitted with a cork and safety tube, reaching to within an inch of the spirit, and a second tube leading to a refrigeratory. Fill the safety tube with the nitric acid, then add through it, gradually and cautiously, f℥iiiss of the acid. When the violent action that ensues is nearly over, gradually add the remaining portion of the acid, f℥ss at a time, and at intervals. The ether that distils over must be agitated first with a little milk of lime, till it ceases to redden litmus paper, and then with half its volume of concentrated solution of muriate of lime. "The pure hyponitrous ether should have a density of 0·899."

II. *The Dublin College* orders purified nitrate of potash, dried and in powder, lb. iss; sulphuric acid lb. j; rectified spirit of wine f℥xix; the acid and spirit are to be first mixed, and then poured very gradually on the powdered nitrate placed in a tubulated retort, and connected with a well-cooled receiver, by means of a bottle, containing a pound of spirit of wine, adopting the usual precautions; the product is to be shaken with about a drachm of dried and finely-powdered carbonate of potassa, and the ether decanted after a time.

III. (*Process of M. Pedroni.*) Crystallized nitrate of ammonia 11 parts; oil of vitriol 8 parts; alcohol 9 parts; mix the last two, and pour them on the salt contained in any suitable distillatory vessel, connected with a well-cooled receiver. Nitrous ether will *gradually* distil over by the application of heat. A common fire may be employed without danger, as the liberation of the ether proceeds gradually, and not almost instantaneously, as in operating in the usual way. Sulphate of ammonia is left in the retort. (Comptes Rendus, 1843.)

IV. Alcohol of 85§, 9 parts; water 4 parts; fuming nitric acid 8 parts; introduce the spirit into a strong cylindrical glass vessel, 3 times as high as wide, capable of holding one-fifth more than the liquid to be placed in it, and by means of a funnel tube reaching to the bottom of the vessel, and having a small orifice; add the water cautiously, so that it may form a stratum beneath the alcohol, without mixing with it; in like manner add the acid, taking care that the three strata do not mix; then tightly stop the vessel, and allow it to repose at a temperature of 53° Fahr., for 2 or 3 days, when the stratum of ether which has formed must be collected and purified by rectification. (Turner's Chem., 7th ed.)

V. (*Liebig's Process.*) Starch 1 part; nitric acid, sp. gr. 1·30, 10 parts; alcohol of 85§, 2 parts; water 1 part; introduce the starch and acid into a capacious retort, connected with a wide tube 2 or 3 feet long, bent at right angles, and terminating near the bottom of a two-necked bottle, containing the alcohol and water mixed together, and surrounded with a freezing mixture or very cold water. The other neck of the bottle must be connected by a wide and long glass tube, with a good refrigerator or condenser. The heat of a water bath must be cautiously applied to the retort, when pure hyponitrous acid will be set free, and passing into the alcohol will form hyponitrite of oxide of ethule, (ether,) which will distil in a gentle stream. The tube connecting the retort and bottle must be cooled by means of a rag or moist paper, wetted from time to time with *ice-cold* water; for if the tube and the alcohol be not carefully cooled, the latter becomes spontaneously hot, and boils violently, when the product is vitiated. This process is very productive and economical, and yields *perfectly pure* hyponitrous ether.

Prop., Uses, &c. Pure hyponitrous ether has a pale yellow color, a mixed odor of apples and Hungary wines, a sp. gr. of 0·947 at 60° Fahr., and boils at 62° Fahr. That prepared by the ordinary processes contains aldehyde, boils at 70°, has a sp. gr. of 0·886 at 40° Fahr., has a similar odor to the former, but at times suffocating, and turns brown when mixed with an alcoholic solution of potassa, while the former remains white. It also becomes acid by age, while *pure* hyponitrous ether remains neutral. The ether prepared by the last formula is chemically pure, (Liebig,) and that by the third, nearly so. The others contain aldehyde. Ordinary hyponitrous ether dissolves in about 48 parts of water, and mixes in all proportions with alcohol and sulphuric ether. (Liebig.)

Hyponitrous ether is refrigerant, diaphoretic, and diuretic, but is seldom employed alone, though, when largely diluted with alcohol, under the name of "sweet spirits of nitre," it is a common remedy. It is also used in the manufacture of British brandy. (See SPIRITS OF NITRE, SWEET.)

ETHER, ŒNANTHIC. *Syn.* ŒNANTHATE OF OXIDE OF ETHULE. This is the oil obtained towards the end of the distillation of fermented liquors, especially wines It is purified by agita-

tion with a weak solution of carbonate of potassa, repose, and decantation. It is lighter than water, boils at 425° Fahr., and has an odor resembling an empty wine cask or bottle that has been exposed to the air for some time. As obtained by distillation, it is united with a little œnanthic acid. 2200 imperial gallons of wine (about 35 hogsheads) only yielded $2\frac{1}{5}$ lbs. of the mixed oil.

ETHER, OXALIC. *Syn.* Oxalate of Oxide of Ethule. Neutral do. A colorless oily liquid, slightly heavier than water, boiling at 370° Fahr., and having an aromatic smell. It was discovered by Thenard.

Prep. Binoxalate of potassa, and alcohol of 90%, of each 4 parts; oil of vitriol 5 parts; mix in a glass retort and distil with a quick fire; as soon as the product becomes turbid when mixed with water, change the receiver, agitate the subsequent product with 4 or 5 times its weight of water, and repeat the agitation with fresh water until the ether becomes neutral to test paper; then rectify it in a dry retort that it will about nine-tenths fill, and as soon as the boiling proceeds smoothly, instead of by jerks, change the receiver; the remaining product will be pure anhydrous oxalic ether. (Ettling.) See Ethers, organic.

ETHER, PHOSPHORATED. *Syn.* Æther Phosphoratus. *Prep.* (P. Cod.) Phosphorus, cut small, 1 part; ether 50 parts; digest with occasional agitation for 1 month, and decant the clear.

ETHER, SULFURIQUE IODURE. *Syn.* Ethereal Tincture of Iodine. *Prep.* Iodine 40 grs.; sulphuric ether ℥j; dissolve. *Dose.* 5 to 10 drops, where the use of iodine is indicated.

ETHER, SULFURIQUE avec le Deuto-iodure de Mercure. *Syn.* Ethereal Tincture of Biniodide of Mercury. *Prep.* Biniodide of mercury 16 grs.; sulphuric ether ℥iss; dissolve. *Dose.* 5 to 12 drops.

ETHERS, ORGANIC. The preparation of some of the organic ethers has been found to be attended with considerable difficulty, and hence have arisen various contrivances to induce the organic acids to combine with the ethereal base. Among the methods generally adopted until lately, may be mentioned the admixture of a salt of the organic acid with alcohol, to which some strong inorganic acid is added, when the acid of the salt being liberated in the nascent state, it enters into a new combination, forming ether. In this way acetic and oxalic ethers are commonly prepared. Or the organic acid being mixed with alcohol, sulphuric or hydrochloric acid is added, by which an organic ether is produced. Benzoic ether may be taken as an instance of this mode of operating. Ethers have also been formed by the simple distillation of some of the organic acids with alcohol, but this method is usually tedious, and requires the repeated return of the products of distillation into the retort, as well as considerable time for its performance, to which several other objections may be added. More recently it has been shown that when the organic acids are heated nearly to their point of decomposition, and alcohol is gradually and cautiously dropped on them, ethers of those acids are readily formed. In this way many of the acids which are wholly or partly volatile—as the oxalic, benzoic, and succinic acids,—yield large quantities of ether. (Gaultier de Claubry.) This method is applicable to most acids that do not suffer decomposition at a low temperature, but in other cases the product would be vitiated and uncertain. Thus, citric acid under this treatment might yield citric, itaconic, citraconic, or aconitic ether, or a mixture of two or more of them, and this in a way entirely beyond the power of the operator to influence. Another method recommended, and very suitable to the preparation of the ethers of the fatty acids, is—to dissolve the organic acid in alcohol, and to pass a current of muriatic acid gas through the solution. A still simpler plan, and which appears likely to supersede most others, at least in the majority of cases, is to mix equal parts of alcohol and the organic acid, with ¼th or ⅕th of oil of vitriol, and to place it in a flask or digester, fitted with a cork, through which passes an upright thin glass tube, 5 or 6 feet long, and after luting the joint quite securely, to submit the mixture to gentle ebullition in a sand-bath, or over a spirit lamp for several hours. In this way the spirituous and ethereal vapors are condensed in the cool portions of the tube, and fall back again into the matrass, by which means no loss of either can possibly occur. A Liebig's refrigerator *reversed* may also be used for this purpose. (See Ether.) By this method some ethers may be readily formed that can scarcely be obtained pure in the usual way. Thus mucic ether may be obtained by this process, which will become perfectly white by crystallization, while by Malagutti's method, the product is quite black, and is purified with difficulty. One or other of the above plans may be adopted for the preparation of those ethers for which formulæ are not inserted in this volume.

ETHERIN. A name applied by some chemists to a hydrocarbon, assumed to be the base of ether. Its atomic constitution, according to this hypothesis, is 4 equivalents each of hydrogen and carbon.

ETHERINE. *Syn.* Camphor of Oil of Wine. A peculiar substance obtained by exposing etherole for a long time to a low temperature. It forms brilliant prisms and plates, and is tasteless, soluble in alcohol and ether, fuses at 230°, boils at 500°, and is a little lighter than water. The crystals are purified by pressure between the folds of bibulous paper, solution in ether, and evaporation.

ETHEROLE. *Syn.* Light Oil of Wine. A hydrocarbon discovered by Hennel. It is prepared by gently heating ethereal oil with water, separating the supernatant light oil, and washing this with water till it becomes quite neutral, after which it is dried by means of chloride of calcium. Etherole is a colorless oily liquid, lighter than water, boiling at 536°, and soluble in absolute alcohol and ether.

ETHIOPS. (See Æthiops.)

ETHIOPS, MARTIAL. *Syn.* Æthiops Martialis. Oxide of iron prepared by keeping iron filings under water, and occasionally shaking them. It must be washed with water, and dried as quickly as possible to prevent its rusting. It was formerly much esteemed as a tonic.

ETHIOP'S MINERAL, (TYSON'S.) *Prep.* Oxide of mercury, (prepared by decomposing calomel with an equivalent proportion of liquor of potassa, to which a little liquor of ammonia has been

added,) and flowers of sulphur, equal parts. Triturate together till perfectly mixed.

Remarks. Mr. Tyson has recommended this as an efficient substitute for the old and uncertain preparation commonly sold under the name of Ethiop's mineral. Mr. Tyson's ethiops is, however, of more than *double* the usual strength, and should therefore be taken in proportionate doses. (Pharm. Journ.)

ETHIOPS, VEGETABLE. *Syn.* Æthiops Vegetabilis. Pulvis Quercus Marinæ. Bladder wrack (fucus vesiculosus) burned in a close vessel till it becomes black and friable. It has been used in bronchocele, &c.; and, like burnt sponge, probably owes any little virtue it may possess to the presence of a very small quantity of iodine.

EUGENIN. *Syn.* Stearoptene of Oil of Cloves. Thin, white, pearly scales, found by Bonastre in oil of cloves. It smells and tastes of cloves, and is soluble in alcohol and ether

EUPHORBIUM, PREPARED. *Syn.* Euphorbium præparatum. *Prep.* Euphorbium 2 oz.; lemon juice, or vinegar, 1 pint. Dissolve, strain, and evaporate to dryness.

EVAPORATION. *Syn.* Evaporatio, (*Lat.*) Evaporation, (*Fr.*) Abdunsten, Abdampfen, (*Ger.*) The dissipation of a fluid by means of heat. In Chemistry and Pharmacy evaporation is had recourse to, either for the purpose of recovering a solid body from its solution, as in the preparation of extracts, chemical salts, &c., or to strengthen a solution by the expulsion of some of the fluid matter that forms the menstruum. Evaporation is also employed, though less frequently, to purify liquids, by dissipating the volatile matters which may contaminate them. Under ordinary circumstances, evaporation is confined to the surface of the heated liquid, and is therefore slower or quicker in proportion to the extension of that surface. Hence has arisen the adoption of wide shallow vessels for containing fluids during their exposure to heat for this purpose.

It has been found that evaporation proceeds most rapidly when a current of air is made to pass over the surface of the fluid, as, in this case, the vapor is prevented resting upon the surface, and impeding the process by its pressure. On the small scale, shallow capsules of glass, Wedgwood-ware, porcelain, or metal, are commonly employed as evaporating vessels, and these are exposed to heat by placing them over a lamp, or naked fire, or in a water-bath, or sand-bath, according to the temperature at which it is proper to conduct the process. On the large scale, high-pressure steam is usually employed as the source of the heat. The term "*spontaneous evaporation*" is applied to the dissipation of a fluid by mere exposure in open vessels, at the common temperature of the atmosphere, and without the application of artificial heat. The celerity of this species of evaporation wholly depends on the degree of humidity of the surrounding air, and differs from the former, in which the rate of evaporation is proportionate to the degree of heat at which the process is conducted, and the amount of pressure upon the surface of the liquid. Evaporation *in vacuo* (as it is called) is conducted under the receiver of an air-pump, or in an attenuated atmosphere, produced by filling a vessel with steam, by which means the air is expelled, when all communication with the external atmosphere is cut off, and the vapor condensed by the application of cold. Fluids are also evaporated in air-tight receivers over sulphuric acid, by which they are continually exposed to the action of a very dry atmosphere. When such a receiver is connected with an air-pump in action, evaporation proceeds with increased rapidity, and intense cold is produced. (See Congelation, Distillation, Extracts, &c.)

EXCORIATION. *Syn.* Excoriatio, (from *excorio*, to flay, or to cut off the skin.) An abrasion. Young children are very apt to be chafed under the arms, behind the ears, between the thighs, and in the wrinkles and folds of the skin, unless great attention is paid to cleanliness, and wiping the skin perfectly dry after washing. Whenever there is a tendency to excoriations of this kind, either in adults or children, a little finely powdered starch, or violet powder, applied by means of a puff, or a small bag of muslin, once or twice a day, will generally remove them, and prevent their occurrence in future. Mild unguents, as cold cream, or spermaceti cerate or ointment, may also be used with advantage. The preference should, however, be given to the former remedies from their not soiling the linen. Excoriations arising from the removal of the skin by friction or external violence, have already been noticed under the head Abrasion.

EXPECTORANTS. (From *expectorare*, to expectorate.) Medicines that promote the secretion of the tracheal and bronchial mucus. According to Dr. Good, true expectorants are "those medicines which rather promote the separation of the viscid phlegm with which the bronchia are loaded, than simply inviscate and dilute it; though these are also treated as expectorants by many writers." Numerous articles of the materia medica have been denominated expectorants, of which the following are the principal:—Tartarized antimony, ipecacuanha, squills, garlic, asafœtida, ammoniacum, the oily resins, the balsams of tolu and Peru, benzoin, styrax, benzoic acid, the fumes of vinegar, tar, and of many of the volatile oils, and the smoke of tobacco and stramonium. Chlorine and ammoniacal gases have also been called expectorants. Medicines of this class are commonly employed in pulmonary complaints and affections of the air-tubes, attended by a vitiated state of the mucus, or an imperfect performance of the natural functions of the secretory vessels. "Of all classes of the materia medica, none are more uncertain in their action than expectorants." (Pereira.) The act of ejecting matter from the chest is called *expectoration.*

EXPRESSION. *Syn.* Expressio, (*Lat.*, from *exprimo*, to press out.) A mechanical operation, by which any fluid contained in the pores or cells of a solid is expelled. Many of the fluid substances employed in pharmacy and chemistry are obtained by expression. Thus, the unctuous vegetable oils, as those of almonds, linseed, &c. &c., are procured by submitting those substances to powerful pressure between iron plates, which are either made warm, or the bruised seeds are previously exposed in bags to the steam of boiling water. The juices of fresh vegetables are also ob-

tained by expression. The substances are first bruised in a marble mortar, or, on the large scale, in a mill, and immediately submitted to the press, to prevent them passing into the state of fermentation, which would injure the quality of the product. Fruits which contain highly-flavored seeds, or which have rinds containing essential oil, should be deprived of them before pressing. The subacid fruits should also be allowed to lie together for some days before being pressed, as the quantity and quality of the product are thereby increased. The fluid matter absorbed by the ingredients employed in the preparation of tinctures, infusions, decoctions, extracts, &c., is generally obtained by powerful pressure. Expression is also frequently employed for the purpose of obtaining solids in a state of purity, as in the expulsion of oleine from stearine, and water from the bicarbonate of soda. On the small scale, the common screw-press, or one of like construction, is usually employed; but the power thus obtained is insufficient to expel the *whole* of a fluid diffused through the pores of a solid. Hence has arisen the use of the hydraulic press, which is alone employed on the large scale. In all these cases, the substances are placed in bags made of hair-cloth, or coarse canvass, previously to their being submitted to pressure.

EXSICCATION. *Syn.* Exsiccatio, (*Lat.*, from *exsicco*, to dry up.) The evaporation of the aqueous portion of solid bodies. In Chemistry and Pharmacy, this term is commonly applied to the operation by which plants and chemical preparations are deprived of their humidity. This is done by exposure to the sun, a current of dry air, an atmosphere rendered artificially dry by sulphuric acid, or by the direct application of heat by means of a water-bath, a sand-bath, or a common fire.

EXTRACTS. *Syn.* Extraits, (*Fr.*) Extracten, (*Ger.*) Extracta, (*Lat.*, from *extraho*, to draw out.) In Chemistry, the residuum from the evaporation of aqueous decoctions, or infusions of vegetable matter. In Pharmacy, preparations obtained by evaporating the expressed juices, or the decoctions, infusions, or tinctures, of vegetable substances, until a mass, of a solid or semi-solid consistence, is formed. Extracts vary in their nature and composition with the substances from which they are prepared, and the fluids employed as solvents. When water is used for making the solution, the extract will usually consist of gum, starch, sugar, albumen, and saline and other matter, along with a peculiar vegetable principle, which, from its occurrence in most plants, has received the name of extractive. This substance was discovered by Fourcroy, and presumed by him to be the common basis of *all* extracts; but it has since been proved by Chevreul, and several other chemists, to be a heterogeneous compound, varying in composition with the plant from which it is extracted. This substance has a brown color, speedily putrefies, and becomes oxidized, and is rendered insoluble by long exposure to air, and by repeated solutions and evaporations. In its unaltered state it is soluble in water, and in alcohol, and is precipitated from its solutions by the acids and metallic oxides. With alumina it forms the basis of several brown dyes. In the preparation of the greater number of extracts, water is employed as the menstruum, and these preparations are called, by way of distinction, "*watery extracts.*" When spirit is employed as the solvent, the extract may contain most of the substances above enumerated, except gum, which is insoluble in strong spirit. Besides these, spirit dissolves out many substances which are either wholly or nearly insoluble in water, as resins, essential oils, and the proximate principles of vegetables. Extracts prepared with alcohol, either alone, or diluted with water, are termed "*spirituous extracts,*" and, with scarcely an exception, are considerably more powerful than the *aqueous extracts* of the same vegetables. In some cases, dilute acid, (the acetic,) or acidulated water, is employed as the menstruum, and such preparations are hence called "*acetic extracts.*" The extracts of aconite, hemlock, henbane, stramonium, and colchicum, as well as of all other plants containing alkaloids, possess greater activity when prepared with vinegar than with water. Thus, a quantity of either the alcoholic or acetic extract of colchicum, equal to the common dose of the *aqueous extract*, would most probably produce death. Still more active extracts may be obtained by a combination of the last two menstrua. According to Ferrari, plants treated with rectified spirit of wine, mixed with one-thirty-sixth part of pyroligneous (acetic) acid, yield extracts of remarkable activity. (Prov Med. Jour., 1843.) To the preceding may be added, that the term *simple* extract is applied to one prepared from a single plant, or vegetable substance, and the term *compound* extract to one prepared from *two* or *more* of such substances.

The above are the principal varieties of extracts employed in British Pharmacy, all of which are classed under the general head *Extracta*, (extracts,) in the London Pharmacopœia; but on the Continent, ether is sometimes used as the menstruum for the active principles of certain substances, as cantharides, cubebs, sem. cinæ, &c.

Of all the foreign Pharmacopœias, that of Baden is most prolific of extracts; its pages contain directions for 58 or 60 of these preparations, of which the following is a brief notice:—

I. Watery Extracts. *a.* (*By displacement with cold water.*) Ext. absinthii; cardui benedicti; centaurii min.; chamomillæ; chinæ fuscæ, (cinchonæ;) chinæ regiæ; dulcamaræ; fumariæ; gentianæ; glycyrrhizæ; graminis ord., (liquid and solid;) ligni campech.; marrubii alb.; millefolii; rhataniæ; rad. saponar; taraxaci, (ordinary and fluid;) tormentillæ; trifolii fibr.

β. (*By the ordinary method of maceration.*) Ext. aloes; myrrhæ; opii; scillæ, valerianæ; chinæ fuscæ.

II. Spirituous Extracts. *a.* (*Prepared with spirit of sp. gr.* 0·944, *by* 24 *hours' maceration, or by the method of displacement.*) Ext. cort. aurantii; angelicæ; rad. arnicæ; calami; calendulæ, (marygold;) cascarillæ; calumbæ; colocynth.; inulæ; hellebori nigri; levistici, (Lovage;) quassiæ; rhæi.

β. (*Prepared in a similar way to the last with spirit of sp. gr.* 0·841.) Ext. aconiti; belladonnæ; chelidonii maj., (great celandine;) conii mac.; digitalis; gratiolæ, (hedge hyssop;) hyoscyami; lactucæ virosæ; pulsatillæ, (Pasque flower;) herb. taxi baccatæ, (yew;) rad. artemisiæ, nucis vomicæ.

III. ETHEREAL EXTRACTS. Cubebs; sem. cinæ; and the roots of male-fern; prepared as the last.

IV. COMPOUND EXTRACTS. Ext. ferri pom.; ext. rhei co.

To the above may be added fel. tauri inspiss.

Though many of the above extracts may be superfluous, yet the directions for their preparation are doubtless very judicious, and it would promote in no small degree the success of the medical practitioner, if a like exactness pervaded the instructions of the London Pharmacopœia, and equal care and skill obtained in the pharmaceutical laboratory in England to that which is general in France and Germany.

Prep. The preparation of medicinal extracts may be conveniently considered under two divisions, viz.: the production of a solution of the soluble portion of the substances operated on, and the reduction of this solution by evaporation to the consistence of an extract.

When water is employed as the menstruum, the vegetable matter subjected to its action should be well bruised or reduced to coarse powder, or otherwise divided by slicing with a knife, that every portion may be fully exposed to the solvent powers of the fluid. The ingredients should then be treated with water until all the soluble matter that it is desired to obtain is dissolved out. There are several methods of effecting this object, depending upon the nature of the vegetable substance acted on. In some cases, maceration in *cold* water is resorted to;—at other times, percolation with that fluid in a displacement apparatus; but more generally, boiling water is poured on the substance, or it is boiled along with water, as in the preparation of infusions and decoctions. After the ebullition or infusion has continued a sufficient time, the heat is removed, and the liquid portion drawn off. The ingredients are then pressed to extract the remaining liquid, or, they are washed with hot water, which expels it by displacement. In the majority of cases, however, a second quantity of water is poured on after the first has been thoroughly drained off, and the infusion or decoction is repeated a second and a third time, or until the ingredients are perfectly exhausted of their soluble portion. The several liquors, being allowed to repose for 15 or 20 minutes, for the purpose of depositing the sand or other gritty and heavy matter that is mechanically mixed with them, are then carefully decanted from the sediment, and, after being run through a fine sieve, or flannel bag, are ready for concentration.

The reduction of the solution to the proper consistence is effected by evaporation; but the mode in which this is performed varies for different extracts. The London College directs that, "unless otherwise ordered, the evaporation should be conducted as quickly as possible, in a broad shallow pan, placed in a water-bath, until a proper consistence is acquired for forming pills; stirring assiduously with a spatula towards the end of the operation." Though the water-bath has the sanction of the British colleges, it is doubtful whether it will be well adapted for ordinary purposes, as, from its low evaporative power, the advantages which are derived from its equable temperature, are vastly overbalanced by the lengthened exposure of the solution in a heated state to the action of the atmosphere. It is doubtful whether a vegetable solution so prepared is not *inferior* in quality to a similar one, evaporated in a shallow pan over a naked fire, or placed in a sand-bath, provided proper care be taken, and assiduous stirring be adopted during the whole time of the exposure to heat. In practice, however, the use of a naked fire is perfectly inadmissible, as the least neglect on the part of the operator would probably lead to the incineration of the whole; but the water-bath may readily be rendered available by the addition of one-fifth part of salt, which will raise its boiling point to 218¼° Fahr., and the temperature of the contained extract to 212°; the remaining 6¼° being lost by the interposition of the substance of the evaporating vessel.

On the large scale the evaporation of extracts is usually conducted in very wide, shallow copper or tinned-copper pans, having steam-tight jackets of cast iron, and heated by allowing steam to play between the two. In this way a very high evaporative power is obtained, and a degree of heat which may be regulated at the will of the operator, and which will at no time much exceed the temperature of boiling water.

The rapid deterioration which vegetable juices and solutions undergo by exposure to the air, especially at high temperatures, has led to the introduction of apparatus, by which they may be concentrated without contact with the atmosphere, and at a less degree of heat than is required for that purpose in open vessels. Such is the method, commonly called *Barry's process*, in which the air is removed from certain air-tight refrigerators by the introduction of steam, which is then condensed by the application of cold, by which means a partial vacuum is obtained. Another process for attenuating the atmosphere over the surface of fluids during evaporation, is by the action of an air-pump. This plan was introduced by Howard, and is commonly applied to the concentration of sirups in our sugar refineries. Extracts obtained by either of these methods are said to be prepared "*in vacuo*," and are found in practice to be immensely superior to the common extracts of the shops, and consequently require to be exhibited in proportionably small doses.

When water, acidulated with acetic acid, is employed in the preparation of extracts, the vegetable substances are usually macerated in it, in the cold, or the dilute acid is sprinkled over the bruised plant in the fresh or recent state, and the whole is then submitted to strong pressure, to expel the juice, which is strained and evaporated in the usual way, but preferably in a tin or plated-copper pan.

Spirituous extracts are prepared by evaporating a concentrated tincture of the vegetable substance in any suitable vessel, by which the volatilized spirit may be saved. *Ethereal extracts* are obtained in a similar manner; but being merely prepared in small quantities at a time, the process may be conveniently performed in glass vessels. When it is required to boil either of the above fluids, or any other volatile liquid on the ingredients, a vessel fitted with a long tube, or a Liebig's refrigerator *reversed*, may be used to prevent any loss of the menstruum. (See ETHER and ETHERS, ORGANIC.)

The inspissated vegetable juices are classed with extracts by the London College, and are ordered to be prepared by evaporating the expressed juice without filtration in a water-bath; but in this way a considerable portion of their activity is lost. Some of these juices, as that of aconite, are impaired in so short a time as scarcely to compensate for the trouble of preparing them. This deterioration does not, however, take place in any remarkable degree, if the expressed juice from the recent vegetable be evaporated by exposing it in a thin stratum to a current of very dry air, as adopted by Mr. Squire. This may be managed by putting the juice into small flat trays or dishes, placed on shelves in a suitably arranged apparatus, alternated with similar vessels of concentrated sulphuric acid, and by causing a current of dry air, at the common temperature of the atmosphere, to pass over them, by which means the moisture continually exhaling from the one will be absorbed by the other. Practical experiments have fully demonstrated the superiority of this method of inspissating vegetable juices over every other plan at present in use; "for it was shown that 10 grains of extract, thus prepared, were more than equal to 20 grains prepared *in vacuo;* and to more than 60 grs. of that prepared by the common process of boiling down the juice to an extract."

The Dublin College directs that all simple extracts, (extracta simpliciora,) unless otherwise ordered, are to be prepared by boiling the vegetable matter in 8 times its weight of water till the liquid is reduced to *one half;* the liquor is then to be expressed, and after a short time allowed for defecation, to be decanted, filtered, and evaporated in a water-bath, until it begins to thicken, and then finally inspissated by a reduced heat, continually stirring until a consistence for forming pills be attained.

I have already mentioned that it is proper to allow the infusion or decoction to purify itself by defecation, and to pass it through a flannel or horse-hair strainer previously to concentration. This may be regarded as a general rule for all ordinary extracts. But in some cases, this method will be found insufficient to render the liquid *clear.* Such solutions may be rendered transparent by clarification with a little white of egg, skimming off the scum as it rises, and straining through flannel in the common way; or they may be filtered through a bag made of very fine *Welsh* flannel, or of twilled cotton cloth, both of which should be soaked in clean water for at least an hour before use. In the small way, filters of linen or paper are sometimes employed; but as all media sufficiently fine to render vegetable solutions transparent soon choke up, such filters are objectionable, from the length of time the liquid has to be exposed to the air when they are employed. In this respect, the method of clarifying first mentioned is vastly preferable, and is inexpensive, expeditious, and easy of performance, and hence has been adopted by many large manufacturers. In some houses, the aqueous infusion or decoction is allowed to repose for 24 hours, and then decanted and evaporated; but such a plan is objectionable; as, however smooth and glossy extracts so prepared may appear, their medicinal virtues are lessened by the lengthened exposure to the atmosphere. Spirituous tinctures should be filtered through paper, and acetic solutions through linen, or paper supported on linen. Ethereal tinctures are preferably clarified by repose and decantation, as the volatility of ether precludes its filtration, except in close vessels.

When about one half of an *aqueous* solution has evaporated, it is often advantageous to repass it through a flannel or horse-hair strainer, to remove the flocculi that generally form by the action of the heat and air. This is especially necessary with vegetable solutions prepared without boiling, and should be adopted whenever a smooth and sightly extract is desired.

The directions previously given for "finishing off" extracts should be scrupulously attended to. Towards the end of the process, the heat should be lessened, and as soon as the extract acquires the consistence of thick treacle, it should be removed altogether, and the remainder of fluid matter evaporated by the heat retained by the copper pan, the process being promoted by assiduous and laborious stirring with a suitably-shaped wooden spatula; and this stirring should be continued until a proper consistence is attained and the extract is nearly cold. It must be carefully observed not to commence the stirring until the heat (steam) has been withdrawn, as, if an extract having a temperature of about the boiling point of water, or even a few degrees below it, be agitated, it becomes full of bubbles, and appears rough and puffy, and this appearance cannot be removed by subsequent stirring, or by any method but re-solution in water and re-evaporation. This is especially the case with the extracts of sarsaparilla, (simple and compound,) gentian, liquorice, and most others of a similar class. A good workman knows from experience the proper time for the removal of the heat, but unpractised persons often fail in this particular. In such cases, should the heat retained by the evaporating pan, and by the extract, prove insufficient to complete the process, a little more may be cautiously applied. Without assiduous and laborious stirring in the way described, a very *smooth* and *glossy* extract cannot be produced. To promote this *artificial* appearance, some persons add 3 or 4 per cent. each of olive oil and gum arabic, dissolved in water, with about 1 or 2 per cent. of spirit of wine.

In conclusion, it may be observed, that the great desiderata to be aimed at in the preparation of extracts are, ***to suit the menstrua and the methods of manipulating to the peculiar characteristics of the active constituents of the vegetable substances operated on.*** The pharmaceutist should always bear in mind that a *perfect* extract should be "***a concentrated, solid mass, exactly representing in medicinal efficacy the materials from which it has been prepared, and capable of being redissolved, so as to form a solution*** EXACTLY ***similar to that whence it has been derived.***" (G. M. Mowbray.) An extract possessing equal strength to the *whole* mass of the ingredients from which it has been prepared, is almost next to an impossibility, however desirable such a degree of perfection may be. The operator may deem himself fortunate, if, after the exercise of the utmost skill and judgment, and accuracy of manipulation, he obtain a product only approximating to the ideal

picture of a perfect extract above quoted. It is a fact that is proved by practical experience, and is readily accounted for by chemical science, that the medicinal properties of *all* solutions of vegetable matter are injured by being reduced to the solid state; and this deterioration, more or less, takes place, whether the solvent be water, proof spirit, or alcohol. Thus the volatile portions, the essential oils, the aroma, &c., are nearly or wholly dissipated, and though these do not always form the principal or active ingredients of the vegetables from which extracts are prepared, yet it cannot be denied that they generally exercise a modifying and controlling influence over the other ingredients, which considerably alters their therapeutical action. That the essential oils which mostly constitute the fragrant portion of vegetables are devoid of efficacy, it would be the height of folly to assert; examples to the contrary may be instanced in the oils of cloves and chamomile. The power of small doses of the former to lessen or prevent the griping properties of some acrid cathartics, and of the latter as a stomachic, are instances familiar to every one who has tried them. Yet in extractum anthemidis, no odor of chamomiles can be perceived, or, at least, if such exists, it is produced by the addition of the essential oil after the solution has been evaporated. But this is a mere trifling deficiency, compared to that in the extracta aconiti, hyoscyami, belladonnæ, conii, &c., prepared according to the pharmacopœial process. In these cases, it is well known that the inert preparations are wholly deficient of the odor of the recent plant, and that in proportion as the odor is developed so is their activity preserved. Compare the powerful smell of the recently expressed juice of hemlock with the scarcely perceptible odor of the extractum conii, P. L. Yet the dose of the one often reaches 20 or 30 grs., while that of the other seldom exceeds 5 or 10 drops, or a portion equivalent in dry ingredients to considerably less than ½ a grain.

Though I have mentioned some processes as preferable to others, and have noticed the inferiority of some of the officinal extracts, yet it is proper to observe that when extracts are ordered in prescriptions, those of the London Pharmacopœia should be alone employed by the dispenser, as the substitution of others would not only be violating faith with the prescriber, but might produce consequences alike injurious to the dispenser and the patient. Many medical gentlemen prefer extracts prepared by particular processes or persons, but such is always indicated in their prescriptions. A serious accident of this sort lately came under my notice. A druggist had prepared a number of prescriptions from an extract which he had purchased of a wholesale drug house, and which was labelled *P. L.*, but was in reality almost inert, and in consequence of the presumed insensibility of the patient to its narcotic action, the medical practitioner had gradually increased the quantity to an enormous extent. In the mean time, the druggist's small stock of extract was exhausted, and another pot purchased of the same parties, which was of an average quality: in came the receipt as usual; but this time it was prepared from the new extract. I need scarcely mention the consequences:—loss of speech, coma, delirium, and death ensued.

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Pres. Extracts should be put into pots as soon as taken from the pan, and, after being securely tied over with bladder, should be placed in a *dry* situation. The London College orders "a small quantity of rectified spirit to be sprinkled upon all the softer extracts, to prevent them becoming mouldy." A better way is, however, to employ a little spirit, holding in solution a few drops of oil of cloves, or a still *less* quantity of creosote. This should be added to them the last thing before removing them from the evaporating pan, and when they are nearly cold. Hard extracts should be kept in bladders or gut skins, placed in stone pots, and well covered over. With care, extracts prepared from recent vegetable substances may be preserved twelve months, or from season to season; and those from dry ingredients, or such as are less inclined to spoil, for perhaps double that time; but beyond these periods their virtues cannot be relied on, and they should consequently be discarded, if remaining unused or unsold.

Qual., pur., &c. The quality of an extract can not be ascertained by mere inspection, nor can it be readily discovered by chemical tests. A knowledge of these facts has induced the mercenary and fraudulent manufacturer to employ damaged and inferior drugs in their preparation, regardless of their slight medicinal virtues and the welfare of the patient. The production of a *smooth, bright*, and *glossy* article is all that is usually attempted by these individuals, and all that is sought after by the mass of purchasers, who mistake the mere external appearances of good quality for its actual existence. But it is a fact, which I can verify from extensive experience in the laboratory, and from years of observation on this point, that the mass of extracts, faithfully prepared from good materials, do not possess such a sightly and pleasing appearance as those commonly vended by the wholesale druggists. I have with great care, for some years, compared the extracts prepared by different metropolitan houses, and, without being desirous of making any remarks hurtful to the feelings, or injurious to the interests of any individual in particular, I feel bound to state, that those extracts that have come under my notice, and which exhibited a remarkably *bright* and *glossy* appearance, I have found to be uniformly inferior, and sometimes nearly inert, while those that appeared less prepossessing were generally of good quality. This is also well established by reference to the extracts of those houses and institutions that are remarkable for the superior quality of their preparations, and by comparing them with the common extracts of the shops supplied by the wholesale trade. Without naming any private individual or establishment in particular, I will only instance the extracts last mentioned, and those of Apothecaries' Hall.

It is a common practice with some manufacturers, not only to pick out the least expensive variety of every drug for the preparation of their extracts, but the most inferior, and often damaged and worthless portion of this already inferior article. I have seen rubbish employed for this purpose that an honest man would not pick off a dunghill; and yet, because the worthless product obtained from this stuff has been "finished off" in such a manner as to exhibit a smooth and glossy

appearance, it has been sold at a good price, and been deemed of superior quality by the purchaser.

A good extract should be free from grit, and wholly soluble in 20 parts of the menstruum employed in its preparation, forming a nearly clear solution; it should have a uniform texture and color, and be of a proper consistence. The extracts prepared from the expressed juices of plants, without straining off the coagulated albumen, are of course exceptions to the second particular.

The best mode of ascertaining the medicinal value of extracts is to assay them for the proximate vegetable principles contained in the plants from which they have been prepared, or, where this is impossible, they may be exhibited in proper doses, and the effects carefully watched. Unfortunately, however, these tests are not easily performed, and are inapplicable to those extracts that exercise no very marked physiological action, unless when taken in repeated doses, and long continued. This want of a ready means of accurately testing the qualities of extracts, has enabled the fraudulent manufacturer to sell inferior articles with impunity, and without even the fear of detection.

Prop. and Uses. The extracts of the shops are generally acknowledged to be the most varying, imperfect, and uncertain class of medicines contained in the pharmacopœia. They are mostly used in the same cases as the plants from which they are prepared, but in smaller doses.

EXTRACT, BLACK. *Syn.* EXT. NIGRUM. Extract of cocculus indicus. It is used by fraudulent brewers to impart an intoxicating property to ale.

EXTRACT OF ACONITE. *Syn.* EXT. OF MONKSHOOD. DO. OF WOLFSBANE. EXTRAIT D'ACONIT, (*Fr.*) EISENHUTLEIN-EXTRAKT, (*Ger.*) ESTRATTO DI ACONITO, (*Ital.*)

Remark. The extract of the root is said to be 12 times as strong as that of the leaves.

EXTRACT OF ALOES. *Syn.* PURIFIED ALOES. ALOES LOTA. GUMMI ALOES. EXTRACTUM ALOES, (P. L. 1809.) EXT. ALOES PURIFICATUM, (P. L. 1824, *and since.*) EXT. ALOES HEPATICÆ, (P. D.) EXTRAIT D'ALOES, (*Fr.*) ALOE-EXTRAKT, (*Ger.*) ESTRATTO D'ALOE, (*Ital.*) *Prep.* (P. L.) Hepatic aloes, in powder, ℥xv; boiling water 1 gallon; macerate for 3 days in a gentle heat, strain, defecate, decant the clear, and evaporate.

Remarks. The object of this process is to deprive the aloes of resin, on which its acrid and griping qualities have been erroneously supposed to depend. When made with the juice, it formed the old ALOES DEPURATA, and with the juice of borage, bugloss, &c., the old ALOE INSUCCATA. *Dose.* 5 to 15 grs., in the same cases as powdered aloes.

EXTRACT OF ANEMONE. *Syn.* EXT. ANEMONIS PRATENSIS. *Prep.* The undepurated expressed juice of the anemone pratensis, evaporated to a proper consistence. It is said to be resolvent, and has been given in some chronic diseases, especially amaurosis, cataract, opacity of the cornea, nocturnal pains, suppressions, &c. (Stoerck.)

EXTRACT OF BARDANA. *Syn.* EXT. OF BURDOCK. EXT. BARDANÆ. *Prep.* (P. Cod.) Grind the root moderately fine with half its weight of distilled water, macerate for 12 hours, then put it into a percolator, and pass temperate water through it until exhausted; filter, and evaporate in a water-bath

EXTRACT OF BARK. *Syn.* EXT. OF CINCHONA BARK. EXTRAIT DE QUINQUINA, (*Fr.*) ESTRATTO DI CHINA, (*Ital.*) CHINA-EXTRAKT, (*Ger.*) *Prep.* I. (*Ext. Cinchonæ, P E. Ext. Corticis Peruviana. Ext. Cinchonæ Resinosum. Ext Corticis Cinchonæ cum Resina.*) Any variety of cinchona bark, reduced to fine powder, ℥iv proof spirit f℥xxiv; percolate, distil off most of the spirit from the tincture, and then evaporate in a water-bath to a proper consistence. (P. E.)

Remarks. The ext. cinchonæ (P. D.) is an aqueous extract of lance-leaved cinchona bark. The above extract is kept in two forms; one *hard* and *dry* for powdering; the other of a pillular consistence. The one is called EXTRACTUM CINCHONÆ MOLLE; the other EXT. CINCHONÆ DURUM. The ext. *cinchonæ cum resinâ*, (P. L. 1788,) and the resinous extract of bark of the shops, are prepared in the same way as extract of cascarilla.

II. (*Extract of lance-leaved cinchona bark; ext. of pale do.; ext. corticis Peruviani*, P. L. 1745, 1788. *Ext. cinchonæ*, P. L. 1809, 1824. *Ext. cinchonæ lancifoliæ*, P. L. 1836.) *Prep.* Pale bark, bruised, ℥xv; water 4 gallons; boil with 1 gallon of water till reduced to 6 pints, and strain while warm; repeat the same process with each remaining gallon of the water, and finally evaporate the mixed solutions.

III. (*Extract of yellow cinchona bark. Ext. of heart-leaved do. Extractum cinchonæ cordifoliæ*, P. L.) *Prep.* The same as the last. Neither this extract nor the following is kept in the shops; and, as far as my knowledge extends, is never employed or asked for.

IV. (*Extract of red cinchona bark. Ext. of oblong-leaved do. Ext. cinchonæ oblongifoliæ*, P. L.) *Prep.* The same as the last.

V. (*Essential salt of bark. Extractum cinchonæ per aquam frigidam.*) *Prep.* (P. Cod.) Exhaust the bruised bark by maceration in successive portions of *cold* water, evaporate the mixed infusions to the consistence of a soft extract, spread it thinly on earthen or porcelain dishes, dry by a gentle heat, and chip off the extract.

Remarks. The aqueous extracts of cinchona bark possess little medicinal virtue, and this principally arises from the insolubility of the alkaloids, (quinine, cinchonine,) or their most valuable portion, in water, and also from the rapid oxidation of their extractive matter, when exposed in solution to the joint action of heat and atmospheric oxygen. The spirituous extract of the P. E. is less objectionable.

Dose. 5 grs. to ʒss, dissolved in water, faintly acidulated with sulphuric acid. Cinchona bark yields about 25§ of aqueous extract.

EXTRACT OF BELLADONNA. *Syn.* EXT. OF DEADLY NIGHTSHADE. EXT. BELLADONNÆ, (P. L. and E.) SUCCUS SPISSATUS BELLADONNÆ, (P. D.) EXTRAIT DE BELLADONNE, (*Fr.*) BELLADONNA-EXTRAKT, (*Ger.*) ESTRATTO DI L'ERBA DI BELLADONNA, (*Ital.*) *Prep.* I. (P. L. and D.) As extract of aconite.

II. (P. E.) Bruise the plant in a marble mor-

tar, express the juice, sprinkle the residuum with water, and again press, mix the two liquids, filter, and evaporate in a water-bath.

Remarks. This extract is an acro-narcotic. *Dose.* ½ gr. to 5 grs. It is principally employed to allay pain and nervous irritation in neuralgia, tic-douloureux, &c.; as an antispasmodic to relieve rigidity and spasms of the muscular fibre in various affections of the uterus, rectum, urethra, bladder, &c., and in hooping-cough; in various maladies of the eyes; and as a resolvent and discutient in several glandular diseases. It has been recommended by some German physicians as a preservative against scarlet fever. It is most frequently employed externally, under the form of a plaster, ointment, or lotion. It is *poisonous.* Fresh belladonna yields about 5§ of extract. (Brande. § Gray.)

EXTRACT OF BISTORT. *Syn.* Ext. Bistortæ. (P. Cod.) *Prep.* As extract of bardana. It is astringent and tonic.

EXTRACT OF BLACK HELLEBORE. *Syn.* Ext. Hellebori Nigri, (P. L. 1788.) Ext. Radicum Helleb. Nig. *Prep.* Macerate the bruised root in 10 parts of boiling water for 24 hours, express the liquid, strain, and evaporate.

Remarks. When prepared by coction with water till exhausted of soluble matter, black hellebore root yields about 40§ of extract. It is alterative, cathartic, and resolvent. *Dose.* 2 to 20 grs.

EXTRACT OF BITTER-SWEET. *Syn.* Ext. of Woody Nightshade. Ext. Dulcamaræ. *Prep.* (P. Cod.) As the last. It is diuretic, diaphoretic, and narcotic.

EXTRACT OF BROOM TOPS. *Syn.* Ext. Cacuminum Genistæ. Ext. Spartii Scoparii, (P. D.) Boil the tops of broom in 8 times their weight of water, till reduced to one half, express the liquid, strain, and evaporate. *Dose.* ½ a dr. to 1 dr., as a diuretic in dropsy. Seldom used.

EXTRACT OF CALAMUS. *Syn.* Ext. of Common Sweet Flag. Ext. Acori. Ext. Calami Aromatici. From the Rhizomes of the acorus calamus.

EXTRACT OF CALUMBA. *Syn.* Ext. Radicis Calumbæ. *Prep.* From calumba root, in the same way as extract of dandelion. Bitter, tonic, stomachic.

EXTRACT OF CANTHARIDIS. *Syn.* Ext. of Spanish Flies. Ext. Cantharidis. Ext. Lyttæ. *Prep.* (P. Cod.) Evaporate a tincture made with proof spirit.

EXTRACT OF CASCARILLA. *Syn.* Ext. Cascarillæ. Ext. Corticis Cascarillæ. *Prep.* (P. L. 1788.) Cascarilla lb. iiss; rectified spirit of wine 1 gallon; macerate for 4 days, and express the liquid; boil the residue in water 2 gallons, and strain. Distil off the spirit from the tincture till the latter acquires the consistence of honey, then mix it with the decoction, also brought to the same consistence by evaporation, and continue stirring until the whole is reduced to a proper consistence.

Remarks. This extract is tonic and stomachic. *Dose.* 5 to 15 grs., or more, 2 or 3 times a day. 28 lbs. of bark yield 5¼ lbs. of extract.

EXTRACT OF CATECHU. Prepared from the wood of the mimosa, or acacia catechu. It is wholly imported, and is commonly known as *Japan earth, terra Japonica,* &c. It is astringent and tonic. *Dose.* 5 grs. to ℥ss, or more. It is mostly used in dyeing and tanning.

EXTRACT OF CHAMOMILES. *Syn.* Ext Florum Chamæmeli. Ext. Chamæmeli, (P. D.) Ext. Anthemidis, (P. E.) Ext. Anthemidis Mobilis. Extrait de Camomille Romaine, (*Fr.*) Kamillen-extrakt, (*Ger.*) Estratto di fiori di Camomillo, (*Ital.*) *Prep.* From the flowers, as extract of dandelion. Bitter, tonic, and stomachic. *Dose.* 10 to 20 grs.

Remarks. This extract contains all the bitter portion of the chamomile, but none of the aromatic volatile oil; the latter being dissipated during the evaporation. It is usually prepared from flowers that have lost their smell from age, and are thus rendered unsaleable. The extract of chamomile that has been lately offered for sale by some houses, and which *smells strongly* of *the flowers,* is prepared by adding 1 drachm of the essential oil to every pound of extract, when nearly cold, and just before removing it from the evaporation pan. The mass of this extract met with in the shops is nothing but extract of gentian flavored with oil of chamomile. 1 cwt. of chamomiles yields about 48 lbs. of extract.

EXTRACT OF COCCULUS. *Syn.* Hard Multum. Black Extract. Ext. Cocculi Indici. *Prep.* By decoction with water. It is narcotic and poisonous. Employed by fraudulent brewers to give a false strength to their liquor.

EXTRACT OF COLCHICUM. *Syn.* Ext. of the Corms of Colchicum. Ext. of Meadow Saffron. Ext. Colchici. Ext. Colchici Cormi, (P. L.) *Prep.* As extract of aconite, P. L. (See page 24.) It is given in the usual cases in which colchicum is employed. *Dose.* 1 to 4 grs. every third or fourth hour. (Thomson.) "This is a favorite remedy of Dr. Hue of St. Bartholomew's Hospital, in the early stages of acute rheumatism. The dose is 1 gr. every four hours." (Pereira.)

EXTRACT OF COLCHICUM, (ACETIC.) *Syn.* Acetic Ext. of Colchicum. Do. of Meadow Saffron. Ext. Colchici Aceticum, (P. L.) *Prep.* Fresh colchicum (cormi) lb. j; acetic acid f℥iij; bruise the corms, sprinkle on the acid, express the juice, and evaporate in a Wedgewood-ware or salt-glazed earthen vessel. *Dose.* 1 to 3 grs. two or three times a day. It is stronger than the common extract.

Remarks. The above extracts are generally prepared from the dried corms, and hence the varying activity and inferior quality of those commonly met with. The simple extract is made by decoction with water and evaporation; but the product rapidly gets dry and crumbly, and will scarcely keep a week in warm weather without becoming mouldy, unless spirit be added. It has not above ¼ of the activity of the *ext. colchici,* P. L. The following form is employed by several wholesale houses, and, I believe, a similar one is adopted by the majority of persons to the exclusion of that of the college:—colchicum (cormi, dried) 14 lbs.; pyroligneous acid (acetic) 6 pints; distilled water 5½ gallons; digest 14 days, filter, and evaporate. *Product.* 2½ to 3 lbs. Inferior to the *ext. colchici aceticum,* P. L. The same quantity of colchicum treated with water, by decoction, yields more than half its weight of simple extract, which is considerably more than that procured by

the process of the college; hence its adoption by the druggists.

EXTRACT OF COLOCYNTH. *Syn.* EXT. OF BITTER APPLES. EXT. COLOCYNTHIDIS MOLLE. EXT. COLOCYNTHIDIS, (P. L., E., & D.) *Prep.* Colocynth pulp, sliced, lb. j; water 2 gallons; boil for 6 hours, adding more water as it wastes, strain and evaporate.

Remarks. This extract rapidly gets hard, crumbly, and mouldy by keeping; but this may be prevented by adding a little spirit, holding in solution a few drops of oil of cloves. *Dose.* 5 grs. to ℈j, as a cathartic. Colocynth pulp yields 65% of extract.

EXTRACT OF COLOCYNTH, (COMPOUND.) *Syn.* COMPOUND EXT. OF BITTER APPLES. EXT. CATHARTICUM, (P. L. 1745.) EXT. COLOCYNTHIDIS COMPOSITUM, (P. L. 1788, and since.) *Prep.* I. (P. L. 1836.) Colocynth pulp, sliced, ℥vj; purified extract of aloes (ext. aloës purif., P. L.) ℥xij; powdered scammony ℥iv; powdered cardamoms ℥j; hard soap (Castile) ℥iij; proof spirit 1 gallon; digest the colocynth in the spirit, with a gentle heat, for 4 days, express the tincture, filter, add the aloes, scammony, and soap, evaporate (distil) to a proper consistence, and towards the end add the powdered cardamoms.

II. (P. D.) The same as the London form, except using hepatic aloes for the aqueous extract.

Remarks. There are few formulæ which have undergone so many alterations in the hands of the College as that for the ext. coloc. co. Before 1809, proof spirit was ordered to be employed as the menstruum, and the preparation resembled that of the present Pharmacopœia, omitting the soap; but in 1809, the College directed *water* to be used instead of *spirit*, and added a certain quantity of *soap.*—Colocynth ʒvj; water lb. ij; aloes (socc.) ℥iss; scammony ℥ss; hard soap ℥iij; cardamoms ʒj. (P. L. 1809.) In the next edition of the Pharmacopœia, or that of 1815, the soap was again omitted; but in the edition of 1824, the formula of 1809 was again adopted, substituting, however, *proof spirit* lb. j for the water. These directions were also continued in the edition of 1836, as will be seen by reference to the above formula, (No. I.,) which is that of the present Pharmacopœia.

Compound extract of colocynth, when faithfully prepared, is a most valuable medicine, but that which is commonly met with in trade is a very inferior and uncertain preparation. This inferiority of the extracts of the shops, chiefly arises from the substitution of water for the proof spirit ordered by the College, and the use of inferior scammony and aloes. There are, however, many establishments where this extract may be procured of most excellent quality, but these are the exceptions, not the rule. As a proof, however, of the proverb, "honesty is the best policy," it may be mentioned that a certain metropolitan druggist, remarkable for the superiority of his compound extract of colocynth, has obtained no inconsiderable fortune by the sale of this preparation alone; while the miserable host of venders of the evaporated decoction of colocynth *seeds*, *Cape* aloes, *worthless* scammony, and *scentless* cardamoms, sold under this name, attempt to ruin each other by offering their rubbish at a price that prevents the possibility of a large profit, or even the establishment of a *respectable* connection.

The following forms are employed by a wholesale house that does very largely in this preparation:

III. Turkey colocynth 18 lbs.; hepatic aloes 40 lbs.; Castile soap 10 lbs.; powdered scammony 6 lbs.; essence of cardamoms 2 lbs.; moist sugar 4 lbs.; boil the colocynth in 20 times its weight of water for six hours; strain and add the aloes; boil until dissolved, and decant the solution. In the mean time exhaust the colocynth with a second quantity of water, less than the first, strain and add this to the undissolved residuum of the aloes, boil again for a few minutes, then draw it off, mix it with the former decoction of aloes, and allow the mixed liquors to stand until the next day, to deposite the resinous portion. Next draw off the liquor, evaporate as quickly as possible, and as soon as the consistence of treacle is arrived at, allow the whole to *cool considerably*, and add the soap (previously melted with a *little* water) and the scammony. Sift the latter in gradually, while the extract is assiduously stirred by a second person. Lastly, moderate the heat and continue the stirring until a rather harder consistence is acquired than is proper for the extract, then, as soon as the whole has become sufficiently cool to prevent any considerable evaporation of the spirit, add the essence, mix thoroughly, and immediately put it into stone jars or pots for use. The extract is usually labelled EXT. COLOCYNTH. COMP. OPT. It looks well, and smells very aromatic.

IV. Turkey colocynth 2¼ lbs.; hepatic aloes 5¼ lbs.; powdered scammony 1½ lbs.; powdered cardamoms 6 oz.; (or essence 8 oz.;) Castile soap (genuine) 1 lb. 2 oz.; pale moist sugar ½ lb.; as the last. This certainly produces a beautiful article, and of excellent quality, though of course inferior to the extract of the College. It is labelled and sent out as EXT. COLOCYNTH. COMP. P. L.

The compound extract of colocynth, and the simple and compound extracts of sarsaparilla, are in greater demand in the wholesale trade, and are sold in larger quantities at a time, than *all* the other *medicinal* extracts put together.

Qual. and Tests. This extract is often adulterated with powerful and acrid cathartics to make up for the deficiency or inferiority of its proper ingredients, and foreign matter often becomes mixed with it by the use of impure scammony. The presence of *Cape aloes* may usually be detected by the odor; *chalk*, (an article frequently present in bad scammony,) by placing a little ball of the extract in a glass tube, and pouring over it some dilute muriatic or acetic acid, when an effervescence will ensue, if that substance be present; *jalap*, *scammony adulterated with fecula*, and other starchy substances, by the filtered decoction of the extract turning blue on the addition of tincture of iodine; *gamboge*, by the decoction becoming deep red on the addition of liquor of potassa, and by a filtered alcoholic solution of the extract forming a yellow emulsion with water, which becomes transparent and assumes a deep red color on the addition of caustic potassa, and by this solution (if the alkali be not in excess) giving a yellow precipitate with acids and with acetate of lead, a brown precipitate with sulphate of copper, and a very dark brown one with the salts of iron. The ethereal solution dropped on water yields an opaque

yellow film, also soluble in caustic potassa, if gamboge be present.

Dose. 5 grs. to ℈j. It is a safe, mild, yet certain purgative. It may be mixed with calomel without the latter being decomposed. 2½ grs. mixed with an equal weight of blue pill and taken overnight, forms an excellent aperient in dyspepsia, liver complaints, &c.

EXTRACT OF CUBEBS. (OLEO-RESINOUS.) *Syn.* Ext. Cubebæ Oleo-resinosum. *Prep.* (M. Dublanc.) Mix the oil obtained by distillation, with the resinous extract obtained by evaporating a spirituous tincture of the dried residuum. Possesses the whole of the virtues of cubebs in a very concentrated form.

EXTRACT OF DANDELION. *Syn.* Ext. of Taraxacum. Ext. Taraxaci, (P. L. & E.) Ext. Herbæ et radicis Taraxaci, (P. D.) Löwenzahn-extrakt, (*Ger.*) Estratto di Tarassaco, (*Ital.*) Extrait de Pissenlit, (*Fr.*) *Prep.* Macerate the fresh root of taraxacum in 10 or 11 times its weight of boiling distilled water for 24 hours, then boil down to ½, strain and evaporate to a proper consistence.

Remarks. The above are the orders of the College, but the extract is better when prepared by rapidly inspissating the expressed juice in a current of dry air. The extract of the shops is usually prepared by exhausting the root by coction with water. The first of the above has a faint and agreeable odor, and a sweet, bitter taste; the second smells strongly of the recent root, has a pale and lively brownish yellow color, and a bitter acidulous taste without any trace of sweetness; the third is devoid of odor, and possesses a coffee-brown color, and a sweetish, burnt taste, not much unlike a solution of burnt sugar. The medicinal virtue of this extract is greatest when the aroma and bitter taste of the recent root are well developed, and when sweet, its efficacy as a remedy is impaired. (Squire.) The Dublin College directs the employment both of the herb and root. Taraxacum root should be gathered during the winter months, as then a given weight of the juice yields more extract, but in summer and autumn it possesses more bitterness and aroma; 4 lbs. of juice from roots gathered in November and December yielded 1 lb. of extract, while it took from 6 to 9 lbs. of juice from the root, gathered in spring or summer, to yield a like quantity. (Squire.) The herb yields by the evaporation of its expressed juice, about 5§ of extract. Good extract of taraxacum should be *wholly* soluble in water. *Dose.* 10 grs. to ʒss, as a resolvent, aperient, and tonic in liver and stomach complaints, &c.

EXTRACT OF DANDELION. *Syn.* Ext. Foliorum Taraxaci. From the leaves, as the last.

EXTRACT OF ELATERIUM. *Syn.* Ext. of Squirting Cucumber. Elaterium. Ext. Elaterii, (P. L.) Succus spissatus momordicæ Elaterii. *Prep.* (*Process of the L. Ph.*) Slice ripe wild cucumbers, *very gently* express the juice, strain through a fine hair sieve, and set it aside for some hours, until the thicker part has subsided; then decant the supernatant liquor, and dry the remainder by gentle heat. (See Elaterium.)

Remarks. Good elaterium should have only a light greenish hue, and should be light and easily pulverized by pressure. Elaterium obtained as a second deposite, is dark and inferior, and hence called elaterium nigrum. The English elaterium is the best. The foreign is uniformly adulterated with chalk, and colored with sap green. *Dose.* One-sixth gr. to 2 grs., as a hydragogue and cathartic, in dropsies.

EXTRACT OF ELATERIUM, (WHITE.) *Syn.* White Elaterium. Elaterium Album. *Prep.* From the *half-ripe* fruit of the squirting cucumber, as last. Its properties are similar.

EXTRACT OF ELECAMPANE. *Syn* Ext. Inulæ. Ext. Radicum Inulæ Campanæ. *Prep.* From elecampane root, like extract of dandelion.

EXTRACT OF FOX-GLOVE. *Syn.* Ext. Digitalis, (P. L. & E.) *Prep.* From the leaves of digitalis purpurea as extract of aconite, P. L. (See page 24.)

Remarks. The juice of foxglove is readily injured by exposure to air and heat. The evaporation should therefore be conducted as rapidly as possible, but at a low temperature. It spoils by keeping. *Dose.* ½ gr. to 3 grs. It is narcotic, sedative, and diuretic, and is powerfully *poisonous.* It is principally given in fevers, dropsy, diseases of the heart, pulmonary consumption, epilepsy, scrofula, and asthma.

EXTRACT OF FUMARIA. *Syn.* Ext Fumariæ. *Prep.* From the leaves of the common fumitory, like extract of dandelion. It has been recommended in some diseases of the leprous kind.

EXTRACT OF GENTIAN. *Syn.* Ext. Gentianæ Molle. Ext. Radicis Gentianæ. Ext. Radicis Gentianæ luteæ, (P. D.) Ext. Gentianæ, (P. L. and E.) Extrait de Gentiane, (*Fr.*) Estratto di Gentiane, (*Ital.*) Enzian-extrakt, (*Ger.*) *Prep.* From gentian root sliced, as extract of dandelion.

Remarks. The Edinburgh College directs the powdered root to be exhausted by percolation with temperate water. On the large scale this extract is almost universally prepared by exhausting the root by coction with water. When well prepared it is one of the smoothest and liveliest-looking extracts of the pharmacopœia. Good gentian root yields by the process of the College fully 50§ by weight of extract, and by decoction about 60§. *Dose.* 10 grs. to ʒss, as a bitter stomachic and tonic. The great consumption of extract of gentian is by the brewers.

EXTRACT OF GENTIAN, (HARD.) *Syn.* Ext. Gentianæ Durum. The last extract reduced to a proper consistence for powdering.

EXTRACT OF GUAIACUM. *Syn.* Ext. Ligni Vitæ. Ext. Guaiaci. Ext. Ligni Guaiaci Molle. *Prep.* (P. L. 1746.) From lignum vitæ shavings or sawdust, by decoction with water.

EXTRACT OF HELLEBORE, (ALKALINE.) *Syn.* Ext. Hellebori Alkalinum. Ext. Hellebori Bacheri. *Prep.* (P. Cod.) Black hellebore lb. j; carbonate of potassa ℥iv; proof spirit and white wine, of each 3 pints; digest 12 hours, strain and evaporate. (See Ext. of Black Hellebore.)

EXTRACT OF HEMLOCK. *Syn.* Succus spissatus Conii maculati. Succus Cicutæ spissatus, (P. L. 1788.) Extractum Conii, (P E.

and P. L. 1809, and since.) SUCCUS INSPISSATUS CONII, (P. D.) ESTRATTO DEL ERBA DELLA CICUTA, (*Ital.*) EXTRAIT DE CIGUE, (*Fr.*) SCHIERLINGS-EXTRAKT, (*Ger.*) *Prep.* (P. L.) From hemlock leaves, like extract of aconite, P. L.

Remarks. The Edinburgh College directs the *filtered* juice to be evaporated in vacuo, or by means of a current of dry air. Of all the inspissated juices (excepting aconite) that of hemlock is most readily injured by exposure and heat. Its active principle is a volatile alkaloid named conia, and in proportion as the extract smells of this substance, so is its medicinal value. Good extract of hemlock should have a green color, a strong odor of the fresh bruised plant, and should develop a strong "*mouse odor*" when triturated with caustic potassa. On the large scale the whole of the green portion of the plant is pressed for juice. 1 cwt. of hemlock yields from 3 to 5 lbs. of extract. *Dose.* 2 grs. to 3ss, as an alterative and resolvent in various obstinate disorders.

EXTRACT OF HENBANE. *Syn.* EXT. OF HYOSCYAMUS. EXT. HYOSCIAMI, (P. L. and E.) SUCCUS SPISSATUS HYOSCYAMI, (P. D.) SUCCUS SPISSATUS HYOSCYAMI NIGRI. EXTRAIT DE JUSQUIAME, (*Fr.*) HYOSZYAMUS-EXTRAKT, (*Ger.*) ESTRATTO DI GIUSQUIAMA NERA, (*Ital.*) *Prep.* (P. L.) From the leaves of henbane, as the extract of aconite, P. L. (See page 24.)

Remarks. The Edinburgh Ph. directs this extract to be prepared in the same way as the extract of hemlock, P. E. 1 lb. of the fresh leaves yielded 8 to 10 drs. of extract, (Geiger;) 1 cwt. yielded 4 to 5 lbs., (Brande;) 1 cwt. of the recent plant yielded by an ordinary screw press 59½ lbs. of juice, and this evaporated in a water-bath gave 5 lbs. 9 oz. of extract. (Squire.) 1¼ cwt. of the green herb yielded 11 pounds of extract. (Gray.) *Dose.* 2 to 20 grs. as an anodyne, and antispasmodic. It is narcotic and *poisonous*.

EXTRACT OF HOPS. *Syn.* EXT. LUPULI, (P. L. and E.) EXT. HUMULI, (P. L. 1809, 1824, and P. D.) *Prep.* From the strobiles of hops, in the same way as extract of dandelion.

Remarks. 1 cwt. of ordinary hops yield about 40 lbs. of extract. (Brande.) The druggists usually employ hops 2 or more years old, called by the dealers "*yearlings*," "*olds*," or "*old olds*," because these may be purchased at ¾ to ⅓ the price of those of the last season's growth. The first of the above are estimated to have only ¾ the strength of new hops; the second about ½; and the last little or none, at least in a medical point of view. *Dose.* 5 to 20 grs., as an anodyne, in cases that do not admit of the use of opium.

EXTRACT OF INDIAN HEMP. *Syn.* EXT. CANNABIS INDICI. *Prep.* (O'Shaughnessy.) Boil the resinous tops of the dried gunjah, (the Indian hemp plant, which has flowered, and from which the resin has not been removed,) in rectified spirit of wine until all the resin is dissolved, then distil off the spirit, and finish the evaporation in a water-bath.

Remarks. It is anodyne, stimulant, and aphrodisiac, and, in over doses, produces catalepsy. (O'Shaughnessy.) 10 to 20 grs. of this preparation have been recommended in hydrophobia; but, according to the above authority, 1 *grain* produced catalepsy in a rheumatic patient. The extract prepared with the plant grown in our botanic gardens has quite a different effect to that of the Indian plant. This hemp is known in India as the "increaser of pleasure," the "exciter of desire," the "cementer of friendship," the "causer of a reeling gait," the "laughter-mover," &c. (For a full examination into the merits of this plant, and the opinions of preceding writers, see Dr. Pereira's valuable work on Materia Medica, 2d ed.)

EXTRACT OF IPECACUANHA. *Syn.* EXT. IPECACUANHÆ. *Prep.* (P. Cod.) Evaporate a tincture prepared from powdered root of ipecacuanha lb. ij, and proof spirit lb. vij, by the method of displacement.

EXTRACT OF JALAP. *Syn.* EXT. JALAPII, (P. L. 1745, 1788.) EXT. JALAPÆ, (P. L. 1809, and since.) EXT. SIVE RESINÆ JALAPÆ, (P. E.) EXT. JALAPII MOLLE. EXT. JALAPÆ RESINOSUM. EXT. RADICIS JALAPÆ. EXT. CONVOLVULI JALAPÆ. EXTRAIT DE JALAP, (*Fr.*)

Prep. I. (P. L.) From the root of the ipomœa jalapa, in the same way as extract of cascarilla, P. L. 1788. *Product.* About 66% of the weight of the jalap employed. (Brande.) 18 lbs. of jalap yield, in this way, 16 lbs. (?) of extract. (Gray.)

II. (P. E.) Moisten finely-powdered jalap with rectified spirit, put it into a percolator, and exhaust it with more spirit; filter, recover the greater part of the spirit by distillation, and finish the evaporation in a water-bath. This is an impure resin of jalap. *Product.* 16%.

III. (P. D.) Similar to the London form, and produces, like that, a mixture of resin of jalap and gummy extractive matter.

Remarks. The extract of the London and Dublin Colleges is purgative in doses of 10 to 20 grs.; that of the Edinburgh in doses of 2 to 6 grs. They should be well beaten up with a little sulphate of potassa, sugar, or some aromatic powder, to prevent griping.

Extract of jalap is kept in the soft state, or of a pilular consistence, and in a hard state fit for powdering. The latter is termed HARD EXTRACT OF JALAP, or EXTRACTUM JALAPÆ DURUM.

The substance commonly sold as extract of jalap in the shops, is prepared by boiling jalap root for 3 or 4 hours in water, when it is taken out, and well bruised or sliced, and again boiled with water until exhausted of soluble matter. The mixed decoctions are then allowed 12 or 14 hours for defecation, after which the supernatant portion is decanted and evaporated.

EXTRACT OF JALAP. *Syn.* EXT. JALAPÆ ALKALINUM. *Prep.* (P. E. 1744.) Add 1 oz. of subcarbonate of potash to the water used for making the extract of jalap, P. L.

EXTRACT OF JUNIPER. *Syn.* EXT. JUNIPERI. *Prep.* (P. Cod.) Macerate juniper berries in warm water (about 85° F.) for 24 hours, strain, repeat the process with a fresh quantity of water; mix the liquors, filter, and evaporate.

EXTRACT OF LETTUCE. *Syn.* SUCCUS SPISSATUS LACTUCÆ SATIVÆ. EXT. LACTUCÆ, (P. L.) EXTRAIT DE LAITUE, (*Fr.*) *Prep.* (P. L.) From the expressed juice of the common garden lettuce, like EXTRACT OF ACONITE, P. L.

Remarks. This extract is anodyne, antispasmodic, soporific, and sedative. *Dose.* 3 to 5 grs. or more, gradually increased, in cases where the

use of opium is objectionable. 1 cwt. of lettuce yields 4 to 5 lbs. of extract. (Brande.) "The proper juice, collected by incisions into the flowering stem when the plant is in flower, is preferable to this extract. A good plant of garden lettuce will yield ʒss of dried juice; of lactuca virosa will yield ʒj." (Thomson.) See LACTUCARIUM.

EXTRACT OF LILY OF THE VALLEY. *Syn.* EXT. OF MAY-LILY. EXT. CONVALLARIÆ. *Prep.* From the flowers or roots, like extract of dandelion. Aperient and laxative. *Dose.* 15 grs. to ʒj.

EXTRACT OF LIQUORICE. *Syn.* EXT. GLYCYRRHIZÆ. (P. L. E. & D.) EXT. GLYCYRRHIZÆ MOLLE. *Prep.* (P. L.) From liquorice root, sliced, as extract of dandelion.

Remarks. The Edinburgh College directs this extract to be prepared like its extract of gentian, by percolation with distilled water, and the Dublin College according to the general rule for simple extracts. It is, however, seldom prepared by the English druggists, being principally imported in the dry state, and only softened down in England. The extract prepared from the fresh root is usually preferred to the *best* foreign, as the latter has a less sweet and agreeable taste. *Foreign* extract of liquorice is commonly called SPANISH or ITALIAN JUICE, being chiefly imported from those countries, that from *Solazzi* being most esteemed. It is also termed BLACK SUGAR, LIQUORICE JUICE, SUCCUS GLYCYRRHIZÆ SIMPLEX, &c. A great deal of the foreign extract is mixed with fæcula, or the pulp of plums; hence its inferior quality. *Refined juice* is prepared by dissolving the foreign juice in water, filtering and evaporating.

Pontefract cakes, or lozenges, are made of refined juice, to which some sugar is added. By the following process an extract of superior quality may be prepared from the imported juice:—A layer of straw is placed in the vessel about half a line above the cock; it is then filled with rolls of liquorice, and water poured over them. After 48 hours this is drawn off, fresh water added, and again drawn off after 24 hours, and this is repeated until the water passes through nearly colorless. On the whole, about 1½ time the weight of the liquorice juice in water is consumed. The residue, when stirred with water, imparts to it but a very faint color. (Möhlenbrock. Buch. Rept. xxviii, 198.)

Soft extract of liquorice is often employed as a pill basis, and the *hard* extract is used as a lozenge to allay tickling cough. The mass of the latter is, however, consumed by the porter brewers.

EXTRACT OF LOGWOOD. *Syn.* EXT. LIGNI CAMPECHENSIS, (P. L. 1745.) EXT. HÆMATOXYLI, (P. L. and E.) EXT. SCOBIS HÆMATOXYLI CAMPECHIANI, (P. D.) CAMPECHEHOLZE-EXTRAKT, (*Ger.*) *Prep.* The College orders this extract to be prepared from the chips, in the same way as the extracts of dandelion, gentian, and liquorice. On the large scale it is prepared by decoction. 1 cwt. of wood yields about 20 lbs. of extract, (Brande;) 80 lbs. yield 14 lbs. of extract, (Gray.) It is kept in two states, *hard and soft.* The *Dose* of the first is 10 to 20 grs. dissolved in wine, or any cordial water, after each motion in diarrhœa; the second may be employed as a lozenge in the same disease.

EXTRACT OF LUPULINE. *Syn.* EXT. LUPULINI. EXTRAIT DE LUPULINE, (*Fr.*) *Prep.* From lupuline by infusion in cold water.

EXTRACT DE LUPULINE AVEC LE DECOCTION. *Syn.* EXT. LUPULINI COCTIONE PARATUM. *Prep.* By boiling with water and evaporating. Both this and the preceding are similar to extract of hops, but stronger.

EXTRACT OF MAHOGANY. Prepared by decoction from the chips or sawdust. It is astringent, and is frequently sold for kino. It is also employed in tanning.

EXTRACT OF MALE FERN. (ETHEREAL.) *Syn.* EXT. FILICIS ÆTHEREUM. BALSAMUM FILICIS. OLEUM FILICIS PESCHIERI. *Prep.* (Peschier.) From the rhizomes, or buds of the male shield fern, (Aspidium filix mas, P. L.)

EXTRACT OF MALE FERN. (ALCOHOLIC.) *Syn.* EXT. FILICIS ALCOHOLICE. *Prep.* As last, but using alcohol.

Remarks. Both the above are given for tapeworm, in doses of ʒss to ʒj, made into an electuary with powdered sugar, followed in 1 or 2 hours by a strong dose of castor oil. Madame Nouffer's celebrated Swiss remedy for tapeworm, for which Louis XVI. gave 18,000 francs, consisted of 2 or 3 drachms of powdered male fern, taken in ¼ pint of water in the morning, *fasting*, followed in 2 hours by a bolus made of calomel and scammony, of each 10 grs.; gamboge 6 or 7 grs. (Pereira.) Heaven help the man who swallowed the whole of this bolus; for it would certainly assist him to the grave!

EXTRACT OF MILLEFOIL. *Syn.* EXT. ACHILLEÆ MILLEFOLII. From the achillea millefolium. As Extract of Dandelion. Astringent and tonic.

EXTRACT OF MIMOSA BARK. Imported from New Holland. Said to be much superior to oak bark for tanning.

EXTRACT OF MYRRH. *Syn.* EXT. MYRRHÆ. *Prep.* (P. Cod.) As extract of squills.

EXTRACT OF MYRRH. (AQUEOUS.) *Syn.* EXT. MYRRHÆ AQUOSUM. *Prep.* Digest coarsely-powdered myrrh in warm water, filter and evaporate.

EXTRACT OF NOSEGAY. *Syn.* EXTRAIT DE BOUQUET. *Prep.* Flowers of benzoin 1 drachm; essence of ambergris 2 oz.; spirit of jasmine and extract of violets, of each 1 pint; spirits of cassia, roses, orange, and gillyflower, of each ½ pint; mix. A most delightful perfume.

EXTRACT OF NUX VOMICA. (ALCOHOLIC.) *Syn.* EXT. NUCIS VOMICÆ, (P. E. and D.) *Prep.* I. (P. D.) Nux vomica, rasped, ℥viij; *proof* spirit 3½ pints; make a tincture, express the liquid, filter, distil off most of the spirit, and evaporate.

II. (P. E.) By percolation, or boiling with *rectified* spirit.

III. (P. Cod.) As extract of squills.

Remarks. This extract consists of impure igasurate of strychnia, and is exhibited in similar cases to that alkaloid. *Dose.* ½ gr. gradually increased to 2 or 3 grs. It is very *poisonous.*

EXTRACT OF OAK BARK. *Syn.* EXT. QUERCÛS. EXT. CORTICIS QUERCÛS, (P. D.) ESTRATTO DELLA QUERCIA, (*Ital.*) EXTRAIT D'ECORCE DE CHEYNE, (*Fr.*) *Prep.* By evaporating an aqueous decoction. Astringent. *Dose.* ℈ss to ℈ij. Seldom used.

EXTRACT OF OPIUM. *Syn.* EXT OPII

(P. E.) Ext. Opii Aquosum, (P. D.) Opium Colatum. Ext. Thebaicum, (P. L. 1720–1745.) Opium purificatum, (P. L. 1788.) Ext. Opii, (P. L. 1809–1824.) Ext. Opii purificatum, (P. L. 1836.) Extrait d'Opium, (*Fr.*) Opiums-extrakt, (*Ger.*) Estratto d'Oppio, (*Ital.*) *Prep.* (P. L.) Opium, sliced, ℥xx; water (temperate) 1 gallon; macerate in a little of the water for 12 hours, triturate with the rest added gradually, until *perfectly* mixed, allow it to repose to deposite impurities, decant, strain, and evaporate.

Remarks. The Edinburgh formula is similar, but the Dublin College orders *boiling* water, and the exposure of the infusion for two days to the air before evaporation. Good opium yields from 60 to 70§ of its weight of extract, but much depends upon the variety of opium. *Dose.* ¼ gr. to 3 grs., as an anodyne, sedative, and hypnotic. It is less stimulant than ordinary opium. It is kept both in the hard and soft state. A solution of the former, in distilled water, with the addition of a little spirit to keep it, forms Battley's *liquor opii sedativus.*

EXTRACT OF OPIUM, EXHAUSTED OF NARCOTINE. *Syn.* Extractum Opii absque Narcotina. *Prep.* (P. Cod.) Reduce the last extract with hot water to the consistence of a sirup, cool, and agitate with repeated portions of ether, then evaporate to a proper consistence.

Remarks. The above form was first proposed by M. Robiquet, in 1821. It is said that the extract so prepared consists entirely of impure meconiate of morphia, gum, and extractive. It is less exciting than the last.

EXTRACT OF OX-GALL. *Syn.* Ext. Fellis Bovini. *Prep.* (P. Cod.) Strain fresh ox-gall, and evaporate in a water-bath.

EXTRACT OF PAREIRA. *Syn.* Ext. Pareiræ, (P. L. and E.) Ext. Pareiræ Bravæ. *Prep.* As Extract of Dandelion, from the root. *Dose.* 10 to 30 grs. In vesical catarrh, and obstructions of the urinary organs.

EXTRACT OF PEACH BLOSSOMS. *Prep.* Essence of lemon 1 oz.; *pure* balsam of Peru and essence of bitter almonds, of each 1 dr.; bitter almonds 1½ lb.; rectified spirit of wine 3 pints; spirits of orange flowers 1 pint; spirit of jasmine ½ pint; macerate. Very odorous.

EXTRACT OF PEPPER. *Syn.* Ext. Piperis nigri. *Prep.* From bruised black pepper by decoction and evaporation. Stimulant. Stronger tasted than pepper. Sometimes given in ague.

EXTRACT OF POPPIES. *Syn.* Ext. of White Poppies. Ext. Papaveris, (P. L. and E.) Ext. Papaveris albi. Ext. Capitum Papaveris Somniferi. Extrait de Pavot, (*Fr.*) *Prep.* From the bruised ripe capsules of the papaver somniferum, (white poppy heads,) without the seeds, as Extract of Dandelion.

Remarks. The medicinal action of this extract resembles opium, but in a considerably weaker degree. It is less prone to produce headache and delirium. *Dose.* 2 grs. to ℈j. It is usually prepared by the large manufacturers, by exhausting the capsules, by coction with water; hence the inferior quality of the extract of the shops.

EXTRACT OF PYROLA. *Syn.* Ext. Pyrolæ Umbellatæ. *Prep.* From the leaves, as Extract of Dandelion. It is strongly diuretic.

EXTRACT OF QUASSIA. *Syn.* Ext. Quassiæ, (P. E.) Ext. Quassiæ Ligni. *Prep* From the wood, (chips,) as Extract of Dandelion.

Remarks. This extract is usually prepared by decoction, and is principally consumed by the brewers, who employ it as a substitute for hops The wood yields about 5 or 6§ of its weight of extract. The bark is frequently substituted for the wood, but is considerably less bitter. *Dose.* 5 to 15 grs.

EXTRACT OF QUINCE SEEDS *Syn.* Ext. Cydoniæ. Ext. Cydoniæ Seminum. *Prep* As Extract of Dandelion.

EXTRACT OF RHATANY. *Syn.* Ext. Rhataniæ. Ext. Krameriæ, (P. E. and D.) *Prep.* From rhatany root, like Extract of Dandelion.

Remarks. This extract is astringent and tonic. *Dose.* 10 grs. to ℈ij. A large quantity of this extract, of very inferior quality, is imported from Brazil, &c. It is kept in two states, *hard* and *soft:* the former resembles kino, and is often sold for it; the latter is chiefly consumed by the manufacturers and improvers of port wine. The Edinburgh College evaporates a cold infusion, obtained by percolation.

EXTRACT OF RHUBARB. *Syn.* Ext. Rhæi. Extrait de Rhubarbe, (*Fr.*) Rhabarber-extrakt, (*Ger.*) *Prep.* (P. L.) Rhubarb (bruised or sliced) ℥xv; proof spirit 1 pint; water 7 pints; macerate for 4 days, with a gentle heat, strain, and evaporate. The Dublin form is similar, but the Edinburgh omits the spirit.

Remarks. This extract is usually prepared by decoction from inferior and damaged rhubarb, picked out from the chest on purpose; hence the inferior quality of the extract of the shops. When made of *good* Turkey, or even East India rhubarb, it is a very valuable preparation. It should be evaporated as rapidly as possible, at a low heat in vacuo, or by means of a current of dry air. *Dose.* As a stomachic 5 to 10 grs.; as a purgative 10 grs. to ʒss. It is seldom exhibited alone. By the London process, good rhubarb yields about half its weight of extract.

EXTRACT OF RHUBARB, (COMPOUND.) *Syn.* Ext. Rhæi compositum. *Prep.* (Prus. Ph.) Extract of rhubarb ʒiij; extract of aloes, and soap of jalap, of each ʒj; mix.

EXTRACT OF RUE. *Syn.* Ext. Rutæ. Ext. Foliorum Rutæ, (P. D.) Ext. Foliorum Rutæ Graveolentis. *Prep.* From rue leaves, like Extract of Dandelion. It is stomachic, carminative, and emmenagogue. *Dose.* 10 to 20 grs. twice a day. It is usual to add a little of the essential oil to the extract, just before taking it out of the evaporating-pan, and when nearly cold.

EXTRACT OF SABADILLA, (ALCOHOLIC.) *Syn.* Ext. of Cebadilla. Ext. Sabadillæ Alcoholicum. *Prep.* Evaporate a saturated tincture of the seeds. *Dose.* ⅛ of a grain in rheumatism, neuralgia, &c. *Poisonous.*

EXTRACT OF SAFFRON. *Syn.* Ext. Croci. Polychroite. *Prep.* Infuse hay-saffron in hot water, strain, and repeat the process until it ceases to give color. *Used* principally as a coloring and flavoring substance by cooks, confectioners, wine and cordial brewers, &c.

EXTRACT OF SAMBUCUS NIGRA. *Syn.* Elder Rob. Ext. Sambuci. *Prep.* I. (P

L. 1788.) The expressed and depurated juice of elder berries, evaporated to the consistence of honey.

II. (P. E. 1744.) Add to the above $\frac{1}{3}$ of sugar.

EXTRACT OF SARSAPARILLA. *Syn.* EXT. SARSAPARILLÆ, (P. D. & P. L. 1809 & 1824.) EXT. SARZÆ, (P. L. 1836.) EXTRAIT DE SALSEPAREILLE, (*Fr.*) *Prep.* (P. L.) From sarsaparilla root, sliced, as Extract of Dandelion. The directions of the Dublin Ph. are the same as for the other simple extracts. For the method of managing this process on the large scale, see DECOCTION OF SARSAPARILLA. *Dose.* 10 grs. to ʒj, in pill, or dissolved in water, or decoction of sarsaparilla.

EXTRACT OF SARSAPARILLA, (FLUID.) *Syn.* EXT. SARZÆ FLUIDUM, (P. E.) EXT. SARSAPARILLÆ FLUIDUM, (P. D.) *Prep.* Sarsaparilla root lb. j; water 9 or 10 pints. Boil for 1 hour, express the liquor, and repeat the process with fresh water; mix the decoctions, and after defecation, strain, and evaporate to the consistence of a *thin* sirup, (P. E.; "to ℥xxx" P. D.,) and when cold add enough spirit to make f℥xvj, (P. E.; "℥ij of rectified spirit" P. D.) See SARSAPARILLA.

EXTRACT OF SARSAPARILLA, (COMPOUND.) *Syn.* EXT. SARZÆ COMP. EXT. SARSAPARILLÆ COMP. There is no form for this preparation in the Pharmacopœias, but it is nevertheless in immense demand in the wholesale trade, from its great convenience in dispensing. ʒvj, dissolved in a pint of water, form a similar preparation to the Compound Decoction of Sarsaparilla of the London College. The dose, in substance, is the same as that of the simple extract. The following formulæ are employed by one of the wholesale houses that does largest in this preparation.

I. Guaiacum shavings, from which the small has been sifted, 30 lbs.; Italian juice 24 lbs.; mezereon root 6 lbs. Boil with water for 1 hour, strain, and repeat the process with fresh water a *second* and a third time; mix the decoctions, and allow them to deposite for 12 or 15 hours, then decant the clear, strain through flannel, evaporate, and when the consistence of treacle is reached, add extract of sarsaparilla 9 lbs.; continue the evaporation, and just before removing the extract from the pan, and when nearly cold, add essential oil of sassafras 2 drs., dissolved in rectified spirit 1 quart. *Prod.* About 45 lbs., depending on the quality of the juice employed. This produces a very showy article if well managed. It is labelled EXT. SARZÆ COMP. The product of the following formula is labelled and sent out as EXT. SARZÆ COMP. OPT.

II. As the last, but only using 15 lbs. of juice, and that Solazzi. *Prod.* About 35 lbs.

Remarks. Each of the above extracts of sarsaparilla, (simple, fluid, and compound,) when of good quality, dissolves in water, forming a deep reddish-brown solution, perfectly transparent, and depositing but *little* sediment, even by standing some days. See SARSAPARILLA.

EXTRACT OF SAVINE. *Syn.* EXT. SABINÆ. EXT. FOLIORUM SABINÆ. *Prep.* (P. L. 1788.) From the plant, as Extract of Dandelion.

Sometimes prepared in small quantities, but it is very seldom asked for. It is usual to add a little essential oil of savine in "finishing it off," to give it an odor of the recent herb.

EXTRACT OF SCAMMONY. *Syn.* RESIN OF SCAMMONY. EXT. SCAMMONII. EXT. SIVE RESINA SCAMMONII, (P. E.) *Prep.* Boil finely-powdered scammony, in successive portions of proof spirit, till all the soluble matter is dissolved, filter, and distil the liquid until little but water passes over; then pour off the remaining water from the resin at the bottom of the vessel, and wash it with successive portions of boiling water; lastly, dry at a temperature under 240° F. (P. E.)

Remarks. As thus prepared it is translucent, brownish, fusible, and combustible; soluble in alcohol, ether, and oil of turpentine. It may be rendered *white* by means of animal charcoal. It is a drastic purgative. *Dose.* 8 to 12 grs. "When pure or virgin scammony can be procured, it is an unnecessary preparation." (Pereira.)

EXTRACT OF SENNA. *Syn.* EXT. SENNÆ. EXT. FOLIORUM CASSIÆ SENNÆ. *Prep.* (P. Cod.) By percolation with temperate water, as Extract of Rhatany, P. E. It is principally used as a basis for purgative pills. When prepared by decoction it is nearly inert.

EXTRACT OF SMOKE, (AQUEOUS.) *Syn.* EXT. FULIGINIS. EXT. FULIGINIS AQUOSUM. *Prep.* Wood-soot ℥ij; water 1 pint. Boil to f℥xvj, filter, and evaporate.

EXTRACT OF SMOKE, (ACETIC.) *Syn.* EXT. FULIGINIS ACETICUM. *Prep.* Wood-soot ℥ij; water and distilled vinegar, of each, $\frac{1}{2}$ pint. As last.

EXTRACT OF SPRUCE. See ESSENCE OF SPRUCE.

EXTRACT OF SQUILLS. *Syn.* EXT. SCILLÆ. *Prep.* (P. Cod.) Squill root, dried, lb. j; proof spirit lb. iv. Digest for some days, express the spirit, add proof spirit lb. ij, again macerate, mix the two tinctures, filter, distil off the spirit, and evaporate to an extract.

EXTRACT OF STRAMONIUM. *Syn.* EXT. OF THORNAPPLE. EXT. STRAMONII, (P., L. E. & D.) *Prep.* (P. L.) Stramonium seeds ℥xv; boiling distilled water 1 gallon. Macerate for 4 hours in a lightly-covered vessel, then take out the seeds, bruise them in a stone mortar, return them to the liquor and boil to one half, strain while *hot*, and evaporate. The Dublin form is similar. *Prod.* About 12§. (Barker.)

II. (P. E.) Rub stramonium seeds (ground in a coffee-mill) to a thick mass with proof spirit, put the pulp into a percolator, and exhaust it of soluble matter by transmitting proof spirit through it; filter the tincture thus obtained, and evaporate. The Paris form is similar. 1 lb. avoirdupois of seeds yields about $2\frac{1}{4}$ oz. of this extract. (Recluz.)

Remarks. On the large scale, this extract is prepared by expressing the juice of the *fresh* herb, boiling the remainder in water, mixing the juice and decoction, filtering and evaporating. $1\frac{1}{2}$ cwt. of stramonium yielded 37 lbs. of juice, and this, with the decoction, gave 31 lbs. of extract. (Gray.) Stramonium has been used in neuralgia, mania, epilepsy, &c. *Dose.* Of the extract $\frac{1}{4}$ gr., cautiously and gradually increased to 2 or 3 grs. It is inferior to the tincture.

EXTRACT OF STYRAX. *Syn.* Ext. of Storax. Ext. Styracis, (P. E.) *Prep.* Boil powdered storax in successive portions of rectified spirit till exhausted, filter the mixed tinctures, distil off the greater part of the spirit, and evaporate the remainder to the consistence of a thin extract. (P E.)

EXTRACT OF TANZY. *Syn.* Ext. Tanaceti. *Prep.* From the herb, as Extract of Dandelion. It is said to be tonic, stomachic, anthelmintic, emmenagogue, and febrifuge. Dr. Clark says that in Scotland it was found to be serviceable in various cases of gout. The infusion is preferable.

EXTRACT OF TEA. *Syn.* Ext. Theæ. *Prep.* Evaporate an infusion of any of the rougher kinds of black tea. Astringent. Has been recommended in diarrhœa, formed into pills. A hard black-looking substance, smelling and tasting faintly of tea, is imported under the same name from China.

EXTRACT OF VALERIAN. *Syn.* Ext. Valerianæ. *Prep.* From valerian root, as Extract of Dandelion, but in a covered vessel. It is usual to add to this extract a *little* of the essential oil of valerian, dissolved in a small quantity of rectified spirit, just before removing it from the evaporating pan, and when nearly cold. *Dose.* 10 grs. to ½ dr. Antispasmodic. Valerian yields about 40% of soft extract.

EXTRACT OF WALNUTS. *Syn.* Ext. Juglandis immaturi. Rob diacaryon sine Melle. *Prep.* Evaporate the expressed juice of unripe walnuts to a soft extract. Vermifuge. Taken in cinnamon water.

EXTRACT OF WHITE BRYONY. *Syn.* Ext. Radicis Bryoniæ albæ. *Prep.* From the bruised root, as Extract of Dandelion. *Dose.* ℈j to ʒj, as a purgative, diuretic, and emmenagogue. Once a common remedy in asthma, dropsy, epilepsy, &c.

EXTRACT OF WHITE HELLEBORE. *Syn.* Ext. Hellebori albi. *Prep.* As Extract of Dandelion; from the root. Emetic and purgative.

EXTRACT OF WHORTLEBERRY. *Syn.* Ext. of Bear's Whortleberry. Ext. of Bearberry. Ext. Uvæ Ursi, (P. L.) From the leaves, as Extract of Dandelion. *Dose.* 5 to 15 grs., twice or thrice a day, in chronic diseases of the bladder and kidneys, attended with increased secretion of mucus, without inflammation.

EXTRACT OF WILD LETTUCE. *Syn.* Ext. Lactucæ Virosæ. Succus spissatus Lactucæ Virosæ. *Prep.* From strong-scented wild lettuce, as the last. It is laxative and diuretic. *Dose.* 3 to 15 grs., in dropsies.

EXTRACT OF WORMWOOD. *Syn.* Ext. Absinthii. Ext. Cacuminum Absinthii. Ext. Artemisiæ Absinthii, (P. D.) Extrait d'Absinthe, (*Fr.*) Estratto Assenso, (*Ital.*) Wermuth-extrakt, (*Ger.*) *Prep.* As the other simple extracts of the Dublin Pharmacopœia. (See page 288.) Bitter and stomachic. *Dose.* 10 grs. to ℈j, 2 or 3 times daily. It is usual to add a few drops of oil of wormwood to the extract before taking it from the pan.

EXTRACTS. (In Perfumery.) These are mostly spirituous solutions of the essential oils, or odorous principles of plants, and of other perfumes. They are generally termed *Extraits* by the perfumers, in imitation of the French, who commonly called their concentrated perfumed spirits by that name. See Extract of Nosegay. Ext. of Peach-blossoms. Esprits. Essences. Spirits, &c.

FALLTRANCK. (*Ger.*, from *fall*, a fall, and *tranck*, drink.) *Syn.* Vulneraire Suisse. Especes Vulneraire. The Suisse. An infusion, or tea, prepared with a mixture of the herbs alchemilla, creeping bugloss, betony, periwinkle, philosella, golden rod, vervain, artemisia, mint, and veronica, gathered among the Alps. It is believed to be of great efficacy for removing the effects of falls and blows.

FARM. (In Agriculture.) A portion of land, with suitable buildings, fences, hedges, and other arrangements necessary for its cultivation, and the rearing of live stock, let or leased to the occupier for a valuable consideration termed *rent*.

FARMERY. (In Agriculture.) The buildings and yards necessary for carrying on the trade or occupation of the farmer. Among the first are the barns, stables, &c.; and among the second the principal are the *rick* yard, yard for watering live stock, and for poultry, &c. The spot and buildings constituting the *farmery*, should be conveniently and centrally situated, for the purpose of abridging, as much as possible, the labor of cartage to and from the more remote portions of the farm.

FARMING. (In Agriculture.) The business of the farmer. The cultivation of lands held on lease, or for a valuable consideration. Under the head Agriculture the reader has been presented with a compendious general outline of the history, principles, and practice of cultivating the soil, and rearing live stock, which constitute the operations of farming; the present article will therefore be confined to a short notice of some of the details. Our remarks may be conveniently distributed under the divisions of—Implements—Preparation of Lands—Fertilization of the Soil—Cultivation of Vegetables—Rearing of Animals—and the Rotation of Crops.

I. On the perfection of *agricultural implements* and *machines* depends much of the improvement of which this art is susceptible. Among the principal of these are the *cart*, *wagon*, and *wheelbarrow*, employed for the purposes of transportation; the *axe* and *saw*, employed for felling and cutting trees; the *shears* for clipping hedges; the *plough* for turning up the ground, as an economical and expeditious substitute for the spade; the *harrow* for pulverizing the soil and smoothing its surface; the *hoe* and *spade* for planting, weeding, and digging; the *shovel*, for removing earth and other loose substances, as in carting, clearing, &c; the *drill*, a machine for sowing seed; and the *cultivator*, a similar machine employed for weeding, harrowing, &c. Most of the preceding are used in the clearing and tilling of land, and preserving it in a proper state; the following are principally used in the immediate collection of the produce or harvest, and its preparation for the market. The *scythe* and *rake* are employed in hay-making, the *sickle* and *cradle* in harvesting corn; the flail for thrashing, and the *fan* for winnowing grain. The

lemons, bergamotte, and turpentine, of the *latter*. The term *oil* is also applied to various *empyreumatic products* of the distillation of organic bodies, and to several unctuous mixtures in perfumery and pharmacy, as well as by liqueuristes to their richer cordials.

OILS, CORDIAL. (*In the art of the liqueuriste.*) Dilute aromatized alcohol, holding in solution a sufficient quantity of sugar to impart an oily consistence. The following is an example of this class of liqueurs:—

OIL OF CEDRAT. (*Crême de Cédrat.*) Spirit of cedrat 1 quart; spirit of citron 1 pint; proof spirit 3 pints; lump sugar 5 lbs.; dissolved in water 6 pints; mix, allow it to stand together for a week, then filter if required. (See CORDIALS, CREMES, LIQUEURS, &c.)

OILS, COMPOUND. *Syn.* MIXED OILS. This term is commonly applied to various mixtures of oils or other ingredients that possess an unctuous appearance. Where not otherwise directed, they are prepared by simply agitating the ingredients together, and after a sufficient time decanting the clear, and filtering if necessary. The following are some of the principal *compound* oils:—

OIL, ACOUSTIC. (*Oleum terebinthinæ acousticum.* Mr. Maule.) Almond oil ℥iv; oil of turpentine ℈ij; mix. *Used* for deafness.

OIL, BLACK. Oil of turpentine 4 lbs.; rape oil 1 gallon; oil of vitriol ½ lb.; British oil ½ lb.; mix well, and in 14 days decant the clear.

OIL, BRITISH. (*Common oil of petre. Ol. petræ vulgare.*) Oil of turpentine 2 lbs.; Barbadoes tar 1 lb.; oil of rosemary 2 oz.; mix well.

OIL OF CAMPHOR. (*Ol. camphoræ nitricum,* Fee.) Nitric acid 460 grs.; camphor 200 grs.; dissolve without heat and decant the oil.

OIL, CAMPHORATED. (*Camphor liniment, linimentum camphoræ,* P. L. and E. *Ol. camphoratum,* P. D.) Camphor ℥j; olive oil ℥iv; dissolve by a gentle heat. Anodyne; discutient; used for sprains, bruises, &c.

OIL, CHABERT'S. Oil of turpentine 3 parts; Dippel's oil 1 part; mix and distil 3 parts. Used in tapeworm.

OIL, DARBY'S. Oil of amber, balsam of sulphur, and Barbadoes tar, equal parts.

OIL, EXETER. (*Ol. excestrense.*) Green oil 2 gallons; euphorbium, mustard seed, castor, and pellitory, of each bruised, ℥j; macerate with occasional agitation for 10 days, and strain.

OIL, FURNITURE. (*Oil stain. Mahogany do.*) Linseed oil 1 gallon; black rosin 1 lb.; alkanet root 12 oz., or less; heat together until sufficiently colored. Some persons use *boiled oil,* and others add a little *beeswax,* and *rose pink.*

OIL, MACASSAR. Olive oil 1 lb.; oils of origanum and rosemary, of each, 1 dr.; mix. *Used* to make the hair grow and curl.

OILS, MIXED. (*Ol. mixta.*) Essences of bergamotte and lemons, of each, ℥j; oils of lavender and pimento, of each, ℥ss; used to scent sal volatile drops, smelling bottles, &c.

OIL, NEAT'S FOOT. (*Nerve oil. Trotter's do. Ol. nervinum. Auxungia pedum tauri.*) From neat's feet and tripe by boiling; does not harden by age; used to soften leather and to fry fritters.

OIL, NEWMARKET. Oils of linseed, turpentine, and St. John's wort, of each, 3 lbs.; oil of vitriol 1 oz.; mix. For sprains in horses.

OILS, NINE. (*Mixed oils. Ol. ex omnibus.*) Train oil 1 gallon; oil of turpentine 1 quart; oil of bricks and amber, of each, 5 oz.; camphorated spirit of wine 10 oz.; Barbadoes tar 2½ lbs.; oil of vitriol 1 oz.; mix. *Used* by farriers.

OIL, PHOSPHORATED. (*Ol. phosphoratum.*)—1. (Ph. Bor.) Phosphorus 12 grs.; almond oil ℥j; dissolve by a gentle heat. *Dose.* 5 to 10 drops made into an emulsion.—2. (Majendie.) Phosphorus ʒj; almond oil ℥ij; macerate in the dark for 14 days, and scent with bergamotte. Stronger than the former. *** A bottle partly filled with oil saturated with phosphorus, will emit enough light in the dark, on the cork being taken out, to see the time by a watch.

OIL FOR QUITTERS. Aquafortis 1 oz.; spirit of wine, and oil of turpentine, of each, 3 oz.; red precipitate ½ oz.; mix. *Used* by farriers.

OIL OF ROSES. 1. Olive oil 1 pint; otto of roses ½ to 1 dr.; mix.—2. To the last add oil of rosemary ½ dr. Either may be colored red by steeping a little alkanet root in the oil (with heat) before scenting it. Used for the hair.

OIL, SHAVING. Soft soap 6 lbs.; rectified spirit of wine 1 gallon.

OIL, SHELDRAKE'S. Nut oil 1 pint; ceruse 2 oz.; boil; when dissolved, add copal varnish 1 pint, and stir till the oil of turpentine has evaporated. Used to grind colors in, to brighten them.

OIL OF SPIKE. (*Factitious.*) 1. Oil of turpentine 3 pints; oil of lavender 1 pint; mix. Used by enamellers to mix their colors in.—2. Oil of turpentine 1 gallon; Barbadoes tar 4 oz.; alkanet root 2 oz.; digest a week. Used as a liniment for horses.

OIL, SULPHURATED. (*Ol. Sulphuratum.*) (See BALSAM OF SULPHUR.)

OIL, TOOTHACHE. (*Toothache Drops.*) 1. Oils of origanum and cloves, of each fʒiij; camphor ʒj; dissolve.—2. To the last add creosote ʒj.—3. Tinctures of pellitory of Spain and colchicum, of each ℥j; creosote and oil of cloves, of each ʒj; mix. Dropped on a piece of lint and stuffed in the tooth, previously wetted with the drops by a camel-hair pencil.

OIL, WEDEL'S. (*Ol. Bezoardicum.*) Almond oil ℥ij; camphor ʒij; essence of bergamot ʒss; alkanet root to color; mix.

OIL, WORM. (*Ol. Vermifugum.*)—1. (Chabert.) Rectified oil of turpentine ʒiv; do. animal oil ʒj; mix. To be followed by a purgative.—2. (*For dogs.*) Turpentine 3 to 4 dr.; castor oil 1 oz.; for 1 dose.

OIL, WATCHMAKER'S. Prepared by placing a clean strip of lead in a small white glass bottle filled with olive oil, and exposing it to the sun's rays at a window for some time, till a curdy matter ceases to deposite, and the oil has become quite limpid and colorless. Used for fine work; does not get thick by age. (See OLEIN.)

OILS, EMPYREUMATIC. Oily fluids obtained by the dry distillation of various animal and vegetable substances. If the ingredients are of a liquid or pasty nature, or become so when heated, they are usually mixed with about twice their weight of sand, to divide them, and thus expose

them more effectually to the action of the fire. They are purified by rectification, either alone or along with water. The following are the principal *empyreumatic oils*:—

Animal Oil. (*Empyreumatic animal oil. Dippel's do. Ol. Animale. Rectified oil of hartshorn. O. Dippelii. O. cornu cervi Rectificatum.*) Chiefly obtained as a secondary product in the manufacture of boneblack; fetid black. A finer kind is made by slowly distilling oil of hartshorn and collecting only the first portion that comes over; pale and thin; discolored by light. Antispasmodic, anodyne, and diaphoretic. *Dose.* 10 to 30 drops in water.

Oil of Benjamin. (*Ol. Benzoini.*) From the residuum of the process of preparing benzoic acid. Used to make mock Russia leather.

Birch Oil. (*Ol. Betulæ.*) From birch-bark, by heating it in an earthen pot with a hole in the bottom to allow the oil to flow through into another jar sunk in the ground and luted to it. Thick, balsamic, odorous; chiefly used to dress Russia leather.

Oil of Bones. (*Ol. Ossium.*) Black, fetid; procured from the makers of boneblack: used to make lampblack.

Oil of Box. (*Ol. Buxi.*) From boxwood without addition. Resolvent.

Oil of Bricks. (*Ol. Lateritium.*) From olive oil mixed with brickdust, and distilled; resolvent, in palsy and gout.—*Factitious oil of Bricks.* Linseed oil 1 lb.; oil of turpentine ½ lb.; oil of hartshorn, or bones, and Barbadoes tar, of each 1 oz.; mix.

Oil, Coal. (See Naphtha.)

Oil of Hartshorn. (*Ol. Cornu Cervi.*) From harts' horns, by distillation.

Oil of Hemlock. (*Pyroconia.*) By the destructive distillation of hemlock.

Oil of Lettuce. (*Empyreumatic.*) From garden lettuce.

Oil of Soot. (*Ol. Fuliginis.*) From wood soot; fetid. Used in epilepsy.

Oil of Tar. (*Jeran. Ol. Pini. O. Pini Rubrum. O. Tædæ. O. Picis liquidæ.*) From tar; reddish; colorless when rectified; soon gets thick. Used as an application to ringworm; contains creosote.

OILS, FIXED. *Syn.* Fat Oils. Unctuous do. Huiles grasses, (*Fr.*) Fette Oele, (*Ger.*) Olea expressa, (*Lat.*) Compounds of carbon, hydrogen, and oxygen, (*hydrocarbons,*) obtained from the organic kingdom, and chiefly distinguished by their insipidity, unctuosity, insolubility in water, and being lighter than that fluid. *Olive oil,* obtained from the vegetable, and *spermaceti oil,* from the animal kingdom, may be taken as types of the rest. The fixed oils are chiefly found in the fruit and seeds of plants, and in thin membranous cells, in various parts of the bodies of animals. Some of these oils are solid at ordinary temperatures; as palm oil, cocoa-nut oil, &c.; but the majority are fluid, except when considerably cooled, when they separate into two portions; the one solid, consisting mostly of stearine, and the other liquid, consisting chiefly of oleine. Nearly all the fixed oils, when freely exposed to the air, absorb oxygen, and either gradually harden, or become rancid. The former are termed drying oils, and are used by painters; the latter are used in cookery, for machinery, lamps, &c. The whole of these oils suffer decomposition at high temperatures, yielding various hydrocarbons; when suddenly exposed to a red heat, they yield a gaseous product, (*oil gas,*) which is used for illumination. It is on this property that candles and lamps furnish their light. The tallow or oil is first converted into gas in the pores of the wick, and this gas, immediately on its formation, enters into combustion, with the production of heat and light. With caustic alkalis and water the fixed oils form soap. When some of these oils are absorbed by porous bodies, and thus expose a vastly increased surface to the air, they absorb oxygen with such rapidity as to generate a considerable degree of heat. Paper, tow, cotton, wool, straw, shavings, &c., slightly imbued with oil, and left in a heap, freely exposed to the air or sun, will often spontaneously inflame. In this way many extensive fires have arisen. The above is especially the case with linseed, rape, and olive oils. The former made into a paste with manganese, rapidly becomes hot, and ultimately takes fire.

Purification. Several fat oils, especially when recently expressed, are purified by violent agitation with 1 to 2§ of concentrated sulphuric acid, when they assume a greenish color, and after about a fortnight, deposite a coloring matter and become paler, and burn with greater brilliancy, particularly if well washed with steam or hot water, and clarified by repose or filtration.—*Another method* is to mix the acid with hot water, and to blow steam through the mixture for some time. The above are generally employed for the glutinous vegetable oils.—*Whale, seal,* or *other fish oil,* is best purified by violent agitation with hot water or steam, by placing it in a deep vessel, and blowing steam into it at the bottom for some time.—*Another method* is to agitate it with a hot infusion of oak bark to remove the albumen and gelatin, next with steam and hot water, and then to filter it through animal charcoal.—Davidson treats whale oil, first with a solution of tan, next with water and chloride of lime, and then with dilute sulphuric acid and warm water.—A very good method is to agitate the oil with a solution of blue vitriol and common salt, and then to filter it through charcoal.—*Olive, almond, castor, rape, nut, linseed,* and some other oils, are readily bleached by exposure to the sun's rays in glass bottles, or by heating them in a wood or tin vessel along with *filtering powder,* 1 to 2 lbs. to the gallon, (see Powders,) agitating for some time, and then filtering them. Animal charcoal is also used in the same way. The *first* method is commonly employed by the druggists and colormen to whiten their castor and linseed oils; and the *second,* by the perfumers for the preparation of their White Almond and Olive Oils, (*Ol. amygdalæ album. Ol. olivæ album.*) 14 to 21 days' exposure to the sun in fine weather, is usually sufficient for castor oil, when placed in 2 to 4 quart pale green glass bottles, and covered by gallipots inverted over them. The oil should be filtered before exposing it to the light, as, if only slightly opaque, it does not bleach well. Almond and olive oils are apt to acquire a slight sulphurous smell when treated as above; but this may be readily removed by filtration through a little animal

charcoal, or by washing it with warm water. Not only the above, but all other oils, may be rendered perfectly colorless by the use of a little chromic acid, or by a mixture of a solution of bichromate of potash and sufficient sulphuric, muriatic, or nitric acid, to seize on all the alkali.—Mr. Watt's method for purifying fats and oils answers admirably for those intended for illumination. He employs a mixture of dilute sulphuric acid with a little nitric acid and bichromate of potash, and some oxalic acid, which are added to the oil or fat in the steaming tub; and after thorough admixture, by blowing steam through the mass, 1 lb. of strong nitric acid mixed with 1 quart of water, is added for every ton of fat, and the boiling continued for half an hour; when a small quantity of naphtha or spirits of turpentine is mixed in, and the whole is finally well washed with water.—Rancid oil is easily purified by boiling it for 15 minutes with a little water and calcined magnesia, or by filtering it through charcoal.

Purity. The purity of the fixed oils is best ascertained from the sp. gr., and by the odor and taste. If pure *olive oil* be shaken in a vial only half filled, the "*bead*," or bubbles, rapidly disappear; but if adulterated with poppy or other oil, they continue longer before they burst.—*Olive oil* is also *completely* solidified when cooled by ice; but poppy oil remains partly liquid, even when it forms less than one-fourth of the mass.—One part of nitrate of mercury (prepared by dissolving 12 parts of mercury in 15 parts of nitric acid, sp. gr. 1·36) mixed with 12 parts of pure olive oil, and well agitated for some time, will form a solid mass in 24 hours, or less; and the degree of hardness thus assumed may be taken as a measure of the purity of the oil.—When olive oil is "carefully mixed with one-twelfth part of its volume of a solution of ℥iv of mercury in f℥viij, ʒvj of nitric acid sp. gr. 1·500, it becomes in 3 or 4 hours like a firm fat, without any separation of liquid oil." (P. E.)—*Almond oil* is frequently adulterated with poppy or nut oil, when its density is increased; or by rape oil, when its density is lessened.—*Pure castor oil* is wholly soluble in strong alcohol.

Prep. The fixed oils, except where otherwise directed, are obtained from the bruised or ground fruit or seed, by means of powerful pressure, in screw or hydraulic presses, and are either allowed to clarify themselves by subsidence, or are filtered. The following are the principal *fixed oils* met with in commerce, or which are objects of interest or utility:—

Oil of Almonds. (*Oleum Amygdalæ*, P. L. O. *Amygdalarum*, P. D.) By expression from either bitter or sweet almonds, usually the former; sp. gr. 0·916 to 0·918. *Prod.* 45%. Demulcent; emollient.

Oil of Bays. (*Ol. Laurinum. O. Lauri.*)—1. By *expression* from bay berries; fluid, insipid.—2. *Boiled Oil of Bays. Butter of do. Ol. Lauri Nobilis. Do. do. Verum.*) From bay berries by boiling; green, buttery; from Italy.

Oil, Beech. (*Ol. fagi.*) From the nuts of fagus silvatica; sp. gr. 0·9225; clear, keeps well; used for salads.

Oil of Belladonna Seeds. Bland; used for lamps in Swabia and Wurtemberg.

Oil of Ben. (*Oil of Behen.*) From the nuts of Moringa aptera; scentless, colorless; keeps long without growing rank. By standing, it separates into two parts, one of which freezes with difficulty. The latter is used in perfumery.

Boiled Oil. (*Drying Oil. Ol. Desiccativum.*)—1. Nut or linseed oil 1 gallon; litharge 12 oz.; sugar of lead and white vitriol, of each 1 oz.; simmer and skim until a pellicle forms, cool, and when settled decant the clear.—2. Oil 1 gallon; litharge 12 to 16 oz.; as last.—3. Old nut or linseed oil 1 pint; litharge 3 oz.; mix, agitate occasionally for 10 days, then decant the clear.—4. Nut oil and water, of each 2 lbs.; white vitriol 2 oz.; boil to dryness.—5. Mix oil with powdered snow or ice, and keep it for 2 months without thawing. Used for paints when wanted to dry quickly.

Oil, Castor. (*Ol. Castorei. O. Ricini*, P. L. E. D.) The best (*cold drawn*) is prepared by pressing the shelled and crushed fruit (seeds) in hemp bags, in a hydraulic press, and heating the oil thus obtained with water in well-tinned vessels till the water boils, and the albumen and gum separate as a scum, which is removed, the oil filtered through flannel, and put into canisters. The commoner kinds are prepared by gently heating the shelled seeds, and pressing them while hot. Another method is to put them into bags, and to boil them in water, when the floating oil is skimmed off. Sp. gr. 0·9611 to 0·969. *Prod.* 25 to 30%. Chiefly used as a purgative. The best is imported from the East Indies in square tin canisters. It is frequently adulterated with rape oil; but this may be detected by its not dissolving in strong alcohol, and also by its less density. Pure castor oil is soluble in an equal weight of alcohol, sp. gr. 0·820.

Oil, Cod's Liver. (*Ol. Aselli. O. Jecoris Aselli. O. Morrhuæ. Huile de Morue.*) Drains from the livers of codfish, when exposed to the sun, and beginning to putrefy. Imported from Newfoundland. Mr. Donovan recommends the fresh livers to be heated to 192°, and then pressed, and the oil separated from the water, and filtered. Brownish yellow. *Dose.* 1 or 2 tablespoonfuls 2 or 3 times a day, in gout, rheumatism, scrofula, &c. It contains a small quantity of iodine and bromine.

Oil of Colza, from the seeds of brassica campestris oleifera. Sp. gr. 0·9136. *Prod.* 39%; burns well in lamps.

Oil, Croton. (*Ol. Crotonis*, P. E. *O. Tiglii*, P. L.) From the shelled seed of croton tiglium, (Molucca grains;) chiefly imported from the East Indies. Yellow or brownish; strongly cathartic. *Dose.* 1 drop.

Oil, Cucumber. From the seeds of cucurbita pepo and melapepo, sp. gr. 0·9231; used in lamps.

Oil, Garden Spurge. (*Ol. Lathyris.*) From the seeds of euphorbia lathyris; cathartic. *Dose.* 4 to 8 drops. *Prod.* 42%. Croton oil, mixed with 5 or 6 times its weight of nut oil, is usually sold for it.

Oil, Gingilie. (*Benne Oil. Ol. Sesami.*) From the seeds of sesamum orientale; used in salads, and in painting.

Oil, Hemp. (*Ol. Cannabis.*) From hemp seed, (cannabis sativa.) Mawkish; used for frying, mixing paints, making soap, &c. Sp. gr. 0·9276.

Oil, Lard. (*Ol. Adipis.*) By separating the oleine from the stearine of lard by means of hot

alcohol. Largely made in America, where alcohol is cheap.

OIL, LINSEED. (*Ol. Lini*, P. L. E. D.)—1. (*Cold-drawn Linseed Oil. Ol. Lini sine igne.*) From the seeds of linum usitatissum et perenne, bruised or crushed, and then ground and pressed without heat. Pale, insipid, viscous; sp. gr. 0·9347; does not keep so well as the next. *Prod.* 18 to 20§.—2. As last, but at a steam heat of 200° F. Amber-colored. *Prod.* 22 to 27§. Both are drying and cathartic. *Used* for painting, in varnishes, &c.

OIL OF MACE, EXPRESSED. (*Myristicæ Adeps*, P. E. *Ol. Myristicæ Expressum*, P. L.) From nutmegs beaten to a paste, exposed to the steam of water, and pressed between heated plates. Orange-colored, fragrant, spicy; buttery or solid. *Prod.* 18 to 20§. When the last has grown discolored and hard by age, it is called *Banda soap*, (ol. macis in massis.)

OIL, MUSTARD. (*Ol. Sinapis.*) From the hulls of black mustard seed; viscid, stimulant. Used in rheumatism. The oils from sinapis dichotoma, ramosa, linensis, glauca, and tori, are sweet, and used for the table; sp. gr. 0·9160. *Prod.* Black mustard 18§,—white or yellow do. 36§.

OIL OF MYRTLE. (*Myrteum.*) From the berries. Butyraceous, odorous.

OIL, NETTLE-TREE. From the seeds of celtis Australis. Used in lamps.

OIL, NICKAR. From guilandina bonducella. Irritant; used in convulsions and palsy.

OIL, NUT. (*Ol. Nucis.*) From hazel nuts, (conglus avellana.) Pale, drying; superior to linseed oil; sold for oils of ben and almonds; sp. gr. 0·9260.

OIL, OLIVE. (*Sweet Oil. Salad Oil. Ol. Olivæ. Ol. Olivarum.*)—1. From olives by cold pressure, (*virgin oil.*)—2. With the heat of boiling water. —3. By boiling the residuum or marc in water. —4. By allowing the bruised fruit to ferment before pressing. The former are used for salads, but the last two for lamps, making soap, &c.—*Provence Oil* (ol. Provinciale) is the most esteemed; *Florence and Lucca Oils* are also of very fine quality; *Genoa Oil* comes next, and then *Gallipoli Oil*, which forms the mass of what is used in England; *Sicily Oil* is inferior, and *Spanish Oil* the worst imported; sp. gr. 0.9176. *Prod.* 32§. *Sweet Oil droppings* are the foots or deposites, and the *drippings;* it is used for soap and machinery. (See OILS, FIXED.)

OIL, PALM. (*Ol. Palmæ. Palm Butter.*) Sp. gr. 0·968. Orange or red; butyraceous; smells of violets; unchanged by alkalis; bleached by the solar rays, age, exposure, sulphuric acid, chlorine, and chromic acid. Demulcent; used to make soap, candles, and ointments; for the latter chiefly because of its fine color.

OIL OF PINE NUTS. (*Ol. Nucis Pini.*) From stone-pine kernels, (pinus pinea;) inferior. *Prod.* 30§.

OIL, PISTACHIA NUT. Sweet; used for salads.

OIL OF PLUM STONES. From prunus domesticus; sp. gr. 0·9127. Burned in lamps in Wurtemburg.

OIL, POPPY. (*Oliete. Ol. Papaveris.*) From the seeds of papaver somniferum; sp. gr. 0·9243. Used for salads, in painting, and for making soap; dries and keeps well; sold for almond oil.

OIL, RAPE. (*Ol. Rapæ.*) From brassica napus and campestris; sp. gr. 0·9128 to 0·9136. Dries slowly, makes soft soaps, good ointments, but bad plasters; smokes in burning.—*Summer Rapeseed Oil*, from brassica præcox; sp. gr. 0·9139.

OIL, PALE RAPE. (*Refined Rape Oil.*) From common rape oil, by violent agitation with 2§ of oil of vitriol, and 4 or 5§ of water, and after 8 or 10 days' repose, decanting the oil, and filtering through flannel or felt. Used for lamps and blacking.

OIL, SEAL. (*Ol. Phocæ.*) Used in lamps.

OIL, SPERMACETI. (*Ol. Cetacei.*) From the head matter of the fish; smells little, and burns well; other pale fish oils, filtered through charcoal, are commonly mixed with it, or sold for it.

OIL, WALNUT. (*Ol. Nucis Juglandis.*) From Juglans regia; soon gets rank. Used to make plasters and paints; dries well; sp. gr. 0·9260. *Prod.* 50§; when *cold drawn*, it is eaten with salads.

OIL, WHALE. (*Train Oil. Ol. Cetaceum.*) From several varieties of the fish; coarse, stinking; sp. gr. 0·9231. Used for machines, in lamps, &c. The southern whale oil is the best.

OIL OF WINE STONES. From the seeds of grapes; sp. gr. 0·9202; bland, emollient, pale yellow. *Prod.* 10 to 11§.

OIL OF YELK OF EGGS. (*Ol. Ovi.*) From yelks of eggs, boiled or fried hard, and then pressed; or broken up, digested in hot alcohol, the tincture filtered, and the spirit distilled off. Commonly used to "*kill*" quicksilver on the Continent.

OILS. (*By infusion.*) *Syn.* OLEA INFUSA. OL. COCTA. These are generally prepared by either digesting or gently boiling the ingredients in 3 or 4 times their weight of olive oil till they become dry and crisp, when they are either pressed or drained dry, and the oil either filtered or allowed to clarify by subsidence. The following are the principal oils that are prepared by *infusion*:—

OIL OF BELLADONNA. (*Ol. Belladonnæ*, P. Cod.) Fresh leaves 1 lb.; olive oil lb. ij.

OIL OF CHAMOMILE. (*Ol. Anthemidis*, P. Cod.) Leaves and flowers 1 lb.; olive oil 3 lbs.; as last.

OIL OF CANTHARIDES. (*Ol. cum Cantharidibus*, P. Cod.) Powdered flies ℥iv; olive oil ℥xxxij; digest 6 hours in a water-bath, and strain with pressure. Stimulant.

OIL OF EARTHWORMS. (*Ol. Lumbricorum.*) From earthworms.

OIL, GREEN. (*Green Elder Oil. Ol. Viride. O. Sambuci viride.*)—1. Green elder leaves 1 lb.; olive oil 1 quart; boil till the leaves are crisp, press out the oil, and again heat it till it turns green.—2. As last, but by maceration under 212°.—3. Elder leaves 1 cwt.; linseed oil 3 cwt. The last is the form usually employed on the large scale. It is generally colored with verdigris ½ lb. to the cwt., the last thing before putting it into casks; as, without great skill and the full quantity of leaves, a very deep green color cannot be obtained. The oil is got from the leaves by allowing them to drain in the pan or boiler, (with a cock at the bottom,) and well heated. Emollient; used as a liniment.

OIL OF HEMLOCK. (*Ol. Conii*, P. Cod.) As oil of belladonna.

From the above it will be readily seen, that by a new grouping of the elements of grape-sugar, alcohol and carbonic acid are produced, without the elements of the body which excites the fermentation taking any part in the conversion.

In the practical production and proper regulation of the vinous fermentation consists the art of the brewer, wine maker, and distiller. The circumstances most favorable to this fermentation, are—a *certain degree of warmth* and a *sufficient quantity of active ferment*, and its *due distribution through the liquor*. The temperature of from 68° to 77° is usually regarded as most propitious for the commencement and progress of fermentation, but it has been ably shown by Liebig, that, at this temperature, the newly formed alcohol slowly undergoes the acetous fermentation, forming vinegar, by which the value of the liquor is lessened. This conversion of alcohol into vinegar proceeds most rapidly at a temperature of 95° Fahr., and gradually becomes more languid, until, at about 46° to 50° Fahr., (8 to 10 C.,) it ceases altogether, while the tendency of the nitrogenous substances to absorb oxygen at this low temperature is scarcely diminished in a perceptible degree. "It is therefore evident, that if wort (or any other saccharine solution) is fermented in wide, open, shallow vessels, as is done in Bavaria, which afford free and unlimited access to the atmospheric oxygen, and this in a situation where the temperature does not exceed 46° to 50° Fahr., (8° to 10° C.,) a separation of the nitrogenous constituents, *i. e.*, the exciters of acidification, takes place simultaneously on the surface, and within the whole body of the liquid." (Liebig.) By this method wine or beer is obtained, which is invariably far superior in quality to that fermented in the usual manner.

The quantity of the ferment, equally with the temperature at which the fermentation is conducted, materially influences the quality of the resulting liquor. We have already noticed, that the most perfect wines are produced from "*must*," which contains the proper proportions of nitrogenized matter and sugar to occasion mutual decomposition during fermentation, so that no nitrogenous constituents, or exciters of fermentation, remain in the liquor, to occasion the acidification of the newly-formed alcohol. When, however, either the one or the other is in excess, a large portion of the sugar remains undecomposed, or the remaining undecomposed nitrogenous matters continue to operate the same effect upon the alcohol as they previously did upon the sugar, but, in this case, with the production of acetic acid instead of spirit.

"So long as sugar and a nitrogenous substance, in a state of continuing decomposition, exist side by side in a fluid, fermentation proceeds. While oxygen is excluded both these processes of transformation, namely, that of the sugar and that of the nitrogenous substance, or ferment, complete themselves side by side and limit each other mutually; so that if the transformation of the sugar is completed before that of the ferment, as happens, for example, in the juice of grapes poor in sugar, there remains, after the completion of the process of fermentation, that is, after the resolution of the sugar into carbonic acid and alcohol, a considerable amount of nitrogenous constituents, retaining the same properties which they possessed in the juice previous to fermentation. This does not happen with the juice of the grapes of southern climates. These grapes are rich in sugar, and a considerable amount of this substance remains undecomposed after all nitrogenous matters have completely separated in an insoluble state, as yeast Such wines alter very little when exposed to the air; the red wines of this kind, however, acidify, because their coloring matter is of ready mutability, and performs, when in contact with the air, the part of the nitrogenous constituents.

"The nitrogenous constituents of the grape-juice, which remain in wine after fermentation, or those ferments or exciters of fermentation in the sugar, of which I have already spoken, after the complete transformation of the sugar, are the exciting causes of the ensuing process of the acidification of the alcohol." (Liebig's Lectures.)

It is obvious that the vinous fermentation is conducted with the greatest success, when the *whole*, or nearly the whole of the saccharine matter is converted into alcohol, and all those substances that tend to excite acidification are thrown down in an insoluble form. When this is the case, the liquor may be preserved for an unlimited period, and will rapidly acquire a degree of maturity, which, under the usual circumstances, occupies some years. To produce this effect in practice, we have only to observe that the ferment and sugar are present in the proper proportions, and to supply the deficiency of the one or the other when this is not the case. The nitrogenized matters constituting the ferments in grape-juice, and vegetable juices generally, have a similar composition to that of the blood, or to the caseine of milk; and the proportions in which they are present appear to depend not only upon the climate, but also upon the nature of the soil in which the vine grows. "The amount of these constituents of blood produced in plants, as in the vine, for instance, may be increased by supplying them with animal manures. Cow-dung is rich in alkalis, which exercise a certain influence upon the increase of the amount of saccharine matter produced by plants; it is poor in nitrogen and the phosphates; that is to say, in substances which minister to the formation of the constituents of blood. The excrements of man contain but a small amount of alkalis, but they act especially and favorably upon the production of the blood constituents; or, if you like the phraseology better, in producing ferments,—agents capable of exciting fermentation in the juices of plants.

"It may therefore be easily understood, that we can exercise a most decided influence upon the quality of the juice of the grape by our manner of cultivation—by a judicious choice of manure. *We may rationally improve a* must, *rich in ferment*, i. e. blood constituents, *by the addition of sugar, and it is a matter of perfect indifference that this sugar has been produced in the organism of some other species of plant; or we may add to the expressed juice of our unripe grapes, the dried ripe grapes of southern climes.* In a scientific point of view, these are real improvements which have nothing in them very recondite, very difficult of comprehension, or objectionable" (Liebig's Lectures.)

The preceding remarks of the illustrious chemist

of Giessen, though specially alluding to the juice of grapes, and to wines, are equally applicable to every other vegetable juice or solution employed in the production of fermented liquors. The British wine-maker, who employs the juice of fruits less saccharine, and less abundant in natural ferment than the grape, may easily supply a sufficient quantity of sugar to produce a liquor equal in strength to the strongest foreign wine; while, at the same time, he may add such a proportion of ferment, if any is required, as will convert the whole of this sugar into alcohol, which he may preserve in the liquor undecomposed, by carrying on the fermentation at a temperature that will oppose its acetification or transformation into vinegar. But perhaps no kind of liquor in general use would be more improved by the practical application of these principles than *cider*. We have already noticed the careless and imperfect way in which the fermentation of apple-juice is usually conducted, and the superiority of the cider of one county over that of another; it is by a *partial* application of this knowledge in the one case, and its neglect in the other, that this difference exists.

In the fermentation of malt wort, the application of these principles has been productive of the greatest advantages. The superiority of Bavarian beer, which is brewed on the above plan, over other beer, has been already noticed; and, in this country, the superior quality of the Scotch and Burton ales (*East India*) over those of our ordinary brewers may be mainly referred to the low heat of the fermentation, and the employment of a proper proportion of ferment, (yeast.)

The exact quantity of yeast required to produce the entire decomposition of the sugar in wort of any given gravity, is a problem which can scarcely be correctly solved, from the varying powers of exciting fermentation possessed by different samples, dependent upon age, &c., and also upon the temperature of the liquor with which they are to be mixed. It has been stated that a quantity of yeast, whose molecules are in a state of active motion, equivalent to 1½ parts of *dried* yeast, are sufficient to effect the perfect fermentation of 100 parts of sugar; but this assertion requires confirmation. The Scotch ale brewer usually employs but 1 gallon of yeast to every 240 gallons of wort, of the average gravity of about 40 lbs. per barrel, and never adds more during the subsequent parts of the process, unless *absolutely* required. In England about 1 per cent. of yeast is the usual dose for worts of the ordinary strength. For a wort of about 30 lbs. per barrel, 2 to 3 lbs. of yeast are usually employed. An excess of yeast should be avoided, as it not only makes the fermentation proceed too rapidly for the production of good liquor, but also greatly increases the temperature of the wort, and renders the process less easily controlled.

In the brewing of beer, the complete conversion of the sugar into alcohol is not permitted by the brewer; but as soon as the daily attenuation of the liquor becomes but trifling, it is "*cleansed*," to prevent the head of the barm mixing with the beer, which would then become "*yeast-bitten.*" In worts that are fermented for the purpose of distillation, this plan is not adopted; but the fermentation is allowed to proceed until the whole of the matter capable of conversion into alcohol has disappeared from the liquor, when it is submitted to the still.

The symptoms of a perfect fermentation of malt wort have been thus described by a writer on brewing.—1. A cream-like substance forms round the edges of the gyle tun, which gradually extends itself, and ultimately covers the whole surface of the liquor. 2. A fine curly, or cauliflower-head, in a similar way extends itself over the surface, and indicates to the experienced brewer the probable quality of the fermentation. 3. The "*stomach*," or vinous odor, is next evolved, and continues to increase with the attenuation of the wort. The peculiar nature of this odor is also an indication of the state of the fermentation. 4. The cauliflower-head changes or rises to a fine "*rocky*" or "*yeasty*" head, and ultimately falls down. 5. In this stage the head assumes a peculiar yeasty appearance, called by brewers "*close-yeasty*," and the gas is evolved in sufficient quantity to blow up little "*bells*" or "*bladders*," which immediately burst, and are followed by others, at intervals depending on the activity and forwardness of the fermentation. These *bells* should be bright and clear; as, if they appear opaque or dirty, there is something the matter with the wort. (Black.)

The *maturation* or *ripening* of beer and wine by age depends upon the slow conversion of the sugar into alcohol which escaped decomposition in the *gyle tun*, or fermenting vessel. This conversion proceeds most perfectly in vessels which *entirely* exclude the air, as in the case of wine in bottles; but when air is present, it is usually accompanied by slow acetification. This is the case of wine in casks; the porosity of the wood allowing the very gradual permeation of the air. Hence the superiority of *bottled* wine over *draught* wine, or that which has matured in wood. Good wine, or well-fermented beer, is vastly improved by age, when properly preserved; but *inferior* liquor, or even superior liquor, when preserved in improper vessels and situations, becomes acidulous, from the conversion of its alcohol into vinegar. Tartness or acidity is consequently very generally, though *wrongly*, regarded by the ignorant as a sign of age in liquor. The peculiar change by which fermented liquors become mature or ripe by age, is termed the "*insensible fermentation.*" It is the alcoholic fermentation impeded by the presence of the already-formed spirit in the liquor, and by the lowness of the temperature.

We have seen that other products besides alcohol are formed, under certain circumstances, during the fermentation of the saccharine solutions of vegetables, and that these substances lessen the value of the alcohol with which they are associated. The principal of these are the oils which pass over in distillation from fermented potato and grain worts. The first has been called *potato spirit oil fuselöl*, &c.; the second *corn-spirit oil*, *oil of grain*, &c. According to Messrs. Bowerbank, the distillers, quoted by Dr. Pereira, 500 gallons of corn-spirit yield about one gallon of oil. Both the above oils are limpid and colorless, and possess a nauseous odor and taste, and are soluble in dilute alcohol in sufficient quantity to render it disagreeable, and unfit for the purposes of a beverage. These peculiar substances abound in all grain spirit

but occur in greater quantity when damaged grain is employed to make the mash. It has been proposed to prevent, or at least to lessen the production of this oil, by not pushing the attenuation of the wort too far, or by the addition of a certain quantity of tartaric acid or bitartrate of potassa to the wort before submitting it to fermentation. The best means of depriving spirits of these, or other substances of a similar nature, is to largely dilute them with water, and to draw them over at a gentle heat. Agitation with olive oil, decantation, dilution with a large quantity of water, and redistillation at a moderate heat, have also been recommended. An excellent method, frequently adopted to purify nauseous whiskey distilled from corn-spirit, is filtration through a series of 6 or 8 vessels, filled with *newly-burnt* and coarsely-powdered charcoal. This plan succeeds perfectly with moderately diluted spirits.

On the Continent the peculiar taste which grain and potato oils impart to spirit is termed "*fusel.*" To remove this, about 10 per cent. of common vinegar, and a *very little* sulphuric acid are added, and well mixed by agitation. The spirit is next allowed to repose for a few days, and then distilled. A solution of chloride of lime is also employed for the same purpose, and in the same way. In both the above cases, a species of ether is formed which possesses a very agreeable odor. In the first case, acetate of oxide of amylol is produced, which has so pleasant a taste and smell of fruit, that "it may be employed for perfuming apartments and making ratifias." The chloride of amylol has also a pleasant ethereal smell and taste. The affinity of the hydrated oxide of amylol (fuselöl) for acetic acid is so great, that they readily unite without the intervention of a mineral acid. (Doebereiner.) Thus, the oil of vitriol mentioned above, though always used in practice, might be omitted without any disadvantage.

It is often of the utmost importance to brewers, wine-merchants, sugar-refiners, &c., to be able to lessen the activity of the vinous fermentation, or to stop it altogether, or to prevent its accession to sirups or saccharine and vegetable solutions. The nature of the animalized matter forming ferment, the presence of which is necessary to fermentation, will readily suggest the proper means to be employed in such cases. Whatever will still the motion of the molecules of the nitrogenous matter forming the ferment, will render them inoperative as exciters of fermentation. Among the simplest means of effecting this object, and such as admit of easy practical application, may be mentioned exposure to either *cold* or *heat.* At a temperature below about 50° F., the acetous fermentation ceases altogether, and the alcoholic fermentation proceeds with diminished activity as the temperature falls, until at about 38° F. it entirely ceases. In like manner, the rapid increase of the temperature of a fermenting liquid will arrest its fermentation, and is preferable to the action of cold, as it is of easier application, and perfectly precipitates the ferment in an inert state. For this purpose, a temperature of about 180 or 200° is preferable, or even that of boiling water may be employed with advantage. In practice, fluids are commonly raised to their boiling point for this purpose, or are submitted to the heat of a water-bath, (207½° F.) In this way the fermentation of sirups and vegetable solutions and juices is usually arrested in the pharmaceutical laboratory.

Among substances that may be added to liquids to arrest fermentation, the most active are—the volatile oil of mustard, coarsely-powdered mustard seeds or *pure* flour of mustard, sulphurous acid or the fumes of burning sulphur, sulphuric acid, sulphite of lime, tincture of catechu, alcohol, strong acetic acid, chlorate of potassa, bruised horseradish, garlic, and cloves, and their essential oils, and all the other volatile oils that contain sulphur, and most of the salts that readily part with their oxygen. All the above arrest fermentation, and render yeast inoporative, and they possess this power nearly in the order in which they stand above. In practice, mustard, the fumes of burning sulphur, and sulphite of lime, are those most adapted for beer, cider, wines, sirups, &c.; but some of the others are occasionally used, though less active. For arresting or preventing the fermentation of the vegetable juices and solutions, and the *medicated* sirups employed in pharmacy, *mustard seed, or this with a little bruised cloves,* should alone be used, as the addition of acids or salts would lead to the decomposition of their active principles. For this reason such liquids should be kept in a sufficiently low temperature to prevent fermentation, and should they pass into that state, it should be preferably arrested by the application of heat or cold, as above explained. (See BREAD, BREWING, YEAST, &c.)

3. The *viscous or mucilaginous fermentation,* is that peculiar change which produces the "ropiness" of wine, beer, and other liquors. This species of decomposition is exhibited in the most complete state, when the juices of carrots, onions, beet roots, &c., are fermented at a temperature of from 100° to 120° Fahr. At ordinary temperatures alcohol is formed, but in this case the sugar is converted into mannite, lactic acid, and a peculiar substance which is precipitated as a species of slimy mucilage on the addition of alcohol. Weak solutions of sugar (1 to 20) boiled with yeast or gluten, and kept at a temperature of from 85° to 105° Fahr., readily pass into this kind of fermentation. The best means of arresting this disposition in fermented liquors, is the addition of a little alum or catechu, dissolved in water, or an infusion or decoction of nut galls. A small quantity of sulphurous or sulphuric acid will produce a like effect. When weak sirups are attacked in this way, the best remedy is to heat them to the boiling point.

4. The *acetous fermentation,* or the production of vinegar by the oxidation of alcohol, has been already briefly touched on, under the head ACETIFICATION. It may be here remarked, that this species of fermentation differs from those previously noticed; for whereas they are capable of continuing in vessels *without* access of air, when once excited, *this* is immediately stopped when the air is *excluded,* and under ordinary circumstances proceeds with a degree of rapidity proportionate to the amount of surface exposed to the action of atmospheric oxygen. It also differs from the alcoholic fermentation by the products being formed, not only by a new grouping of the elements of the substance undergoing decomposition, but by means

of oxygen not previously contained in that substance.

Pure alcohol diluted with water does not acidify by mere exposure to the atmosphere, but when mixed with organic matters, as in the state it exists in fermented liquors, it readily absorbs oxygen, and passes into vinegar. This change takes place most rapidly at a temperature of 95° Fahr., and gradually lessens in activity as the temperature falls, until at about 50° it ceases altogether. The acetous fermentation spontaneously follows the vinous fermentation, when the fermented liquor is left exposed at ordinary temperatures, and in some cases the two fermentations simultaneously occur in the same liquid; the newly formed alcohol passing slowly into vinegar, while the undecomposed sugar is being converted into alcohol. From the simultaneous existence of the two fermentations in the same liquid, some persons who have only imperfectly investigated the subject, have been led to suppose that the saccharine matter is capable of *direct* conversion into vinegar; but the falseness of this supposition is fully demonstrated by careful observation.

According to the researches of Doebereiner and E. Davy, 1 equivalent, or 46 parts of alcohol, absorb 4 equivalents, or 32 parts of atmospheric oxygen during the process of acetification, and hence are formed 1 eq. or 51 parts of dry acetic acid, and 3 eq. or 27 parts of water; or, which is the same thing, 1 eq. or 60 parts of glacial acetic acid, and 2 eq. or 18 parts of water. This will be rendered familiar by reference to the following diagram:—

1 eq. of dry acetic acid . . . = $C_4\,H_3\,O_3$
3 eq of water . . . . = $H_3\,O_3$

$$\left.\begin{array}{l}\text{1 eq. of alcohol } C_4\,H_6\,O_2 \\ \text{4 eq. of oxygen} \quad . \quad . \; O_4\end{array}\right\} \; . \; = C_4\,H_6\,O_6$$

This transformation has been lately shown to result from the oxidation of a *portion* of the hydrogen of the alcohol, forming *water* and *aldehyde*, and from the absorption of atmospheric ogygen by the *latter*, by which it becomes converted into acetic acid. (Liebig.) See ACETIFICATION, ACETIC ACID, and VINEGAR, and the preceding article on the VINOUS FERMENTATION.

5. *Putrefactive fermentation.* (See PUTREFACTION.)

To the preceding it may be added, that if a little white cheese curd be mixed with a solution of sugar, and the mixture be preserved at from 76° to 86° Fahr., and kept neutral with chalk, the sugar will entirely disappear, hydrogen and carbonic acid will be given off, and a considerable amount of butyric acid will be found in the fluid. This has been called the "butyric fermentation," and is highly interesting and important, from the explanation it affords of the production of fat in animals.

FERRIC ACID. This acid has only been obtained combined with potassa, forming a *ferrate* or *perferrate* of that alkali. Fremy, the discoverer of this new compound, prepared it by calcining a mixture of the peroxides of iron and potassium, or by igniting a mixture of potassa and oxide of iron, or by injecting nitre on iron in fine powder, and heated to redness in a crucible. The following form, published by Trommsdorff, will, however, be found more convenient and certain:—Finely-pulverized iron filings 2 dr.; pulverized saltpetre 4 dr.; mix, place it in an 8 or 10 oz. crucible, heated to a glowing red, still standing on red-hot coals, and when combination takes place on one side, shown by the evolution of light and white fumes, remove it from the fire. As soon as the deflagration of the mixture has ceased, scrape out the mass on to a *cold* plate, by means of an iron spatula. THE PRODUCT is a dark reddish-black mass, forming a superb cherry-red solution with water, which quickly undergoes decomposition, depositing sesquioxide of iron, and evolving pure oxygen. It is the substance employed by Dr. Payerne to keep up the vitality of the air in diving-bells, unconnected with the atmosphere. For this purpose, it is only necessary to drop a piece occasionally into a vessel of water.

FERRIDCYANIDE OF IRON. *Syn.* HYDRO-FERRIDCYANATE OF IRON. TURNBULL'S BLUE. *Prep.* Precipitate a solution of proto-sulphate of iron by another of red prussiate of potash. (Ferridcyanide of potassium.)

Remarks. This is a variety of Prussian blue, of remarkably beautiful color, and may be distinguished from the ordinary Prussian blue of commerce by its action on the yellow prussiate of potash. When boiled in a solution of the latter it is decomposed, a portion is dissolved, and a gray residue remains.

FERRIDCYANIDE OF POTASSIUM. *Syn.* RED PRUSSIATE OF POTASH. HYDRO-FERRIDCYANATE OF POTASSA. RED FERROCYANIDE OF POTASSIUM. *Prep.* Pass chlorine gas through a very dilute solution of ferrocyanide of potassium, evaporate it when the oxidation is complete, and add to the boiling liquor, when it is near its crystallizing point, a few drops of solution of potash; the green substance is then decomposed, and flocks of peroxide of iron separate. It is very easy to observe the moment at which the object is attained, and care must be taken not to add too much potash, because an excess of it would convert the ferridcyanide of potassium into ferrocyanide. The solution is to be filtered hot to separate the peroxide of iron; it possesses a deep purplish red color, is to be cooled very slowly, and then fine crystals of the salt are obtained. (M. Posselt.)

FERRID-CYANOGEN. A compound formed by treating ferrocyanide of potassium with chlorine. It unites with 3 eq. of hydrogen, forming a tribasic acid, termed hydro-ferrid cyanic acid.

FERROCYANIC ACID. *Syn.* FERROCHYAZIC ACID. HYDRO-FERROCYANIC ACID. *Prep.* I. Dissolve yellow prussiate of potash in water, and add a solution of hydrosulphuret of baryta, as long as a precipitate falls, filter, wash the powder with cold water, dry, dissolve 100 parts in cold water, add 30 parts of concentrated sulphuric acid, mix well, and after repose decant the clear. (M. Perrett.)

II. Diffuse recently precipitated ferrocyanide of lead or copper through water, decompose it by passing a stream of sulphureted hydrogen through the liquid, and filter. (Berzelius.)

III. Agitate with ether a concentrated aqueous solution of ferrocyanic acid as obtained by the decomposition of ferrocyanide of lead by means of sulphuric or hydrosulphuric acid; the acid separates immediately, and may be obtained by filtration; this remarkable separation of the acid from

the water which holds it in solution, requires but little ether. If the solution is moderately concentrated, the whole forms a thick mass by agitation, and after some time the ferrocyanic acid suspended in the ether separates from the water saturated with ether, and swims on the surface. The water is to be removed by a pipette; the thick mass is to be put on a filter and washed repeatedly with a mixture of alcohol and ether, containing a considerable portion of the latter; it is then to be pressed between the folds of absorbent paper to remove the moisture, and afterwards to be perfectly dried over sulphuric acid in the air-pump.—

Or prepare concentrated solution of ferrocyanide of potassium with boiled water, cool without contact with the air, add an excess of hydrochloric acid, also deprived of air, and agitate with ether as before; dissolve the separated acid in alcohol, to which a little sulphuric acid has been added, filter if not clear, and agitate with ether; the separated acid is to be dried as before described. (M. Posselt.)

Remarks. The lemon-colored solutions obtained by the first two processes, should be cautiously evaporated over sulphuric acid, in vacuo, when ferrocyanic acid will be obtained under the form of a crystalline mass. By the last method it is procured in the state of a white powder, frequently with a slight blue or yellow tint. This acid is decomposed by heat and moisture, when in contact with the air. With the metallic oxides it forms the compounds termed ferrocyanides, ferrocyanates, hydroferrocyanates, or prussiates. The insolubles, ferrocyanides, may all be formed by the mixture of a soluble salt of the metal with a solution of the prussiate of potash. (See PRUSSIAN BLUE and PRUSSIATE OF POTASH.)

FERROCYANIDE OF AMMONIUM. *Syn.* HYDRO-FERROCYANATE OF AMMONIA. FERROCYANATE OF DO. PRUSSIATE OF DO. *Prep.* Digest ferrocyanide of lead in a solution of sesquicarbonate of ammonia at a gentle heat, filter, evaporate, and crystallize.

FERROCYANIDE OF BARIUM. *Prep.* Digest pure Prussian blue in powder, in baryta water. It forms efflorescent prismatic crystals by evaporation. Soluble in 4½ parts of water.

FERROCYANIDE OF COPPER. *Syn.* PRUSSIATE OF COPPER, &c. *Prep.* Precipitate a solution of a salt of copper with another of prussiate of potash; collect the powder, wash it with water and dry. Has a beautiful reddish brown color.

FERROCYANIDE OF IRON is only known in the double ferrocyanides of iron.

FERROCYANIDE OF LEAD. *Syn.* PRUSSIATE OF LEAD, &c. *Prep.* From a soluble salt of lead by the addition of a solution of prussiate of potash. A yellowish white powder.

FERROCYANIDE OF MERCURY. *Prep.* From a salt of mercury, as the last. A white powder, which undergoes decomposition as soon as precipitated.

FERROCYANIDE OF ZINC. A white powder precipitated from a solution of a soluble salt of zinc, by adding ferrocyanic acid, or a solution of prussiate of potash. The latter solution also precipitates *white* FERROCYANIDES from solutions of the salts of SILVER and BISMUTH, a *greenish white* one from those of nickel, a *green* one turning red from the salts of cobalt, and a *white* one, changing to a *peach-color*, from the salts of the protoxide of manganese.

FEVER. *Syn.* FIEVRE, (*Fr.*) FEBRIS; PYREXIA, (*Lat.*; the former from *ferveo, I burn,* whence the English word; the latter from πυρ, *fire.*) The name of an extensive and important class of diseases, one of the most general symptoms of which is an increased heat of the body. Fevers have been divided by nosologists into *intermittents,* (intermittentes,) and *continued fevers,* (continuæ.) The first of these are generally known by the name of agues, and the latter have been divided into *synocha,* or inflammatory fever; *typhus,* putrid or low fever; and *synochus,* or the common continued or mixed fever, which commences with symptoms allied to the former, but terminates with those of typhus. The terms *hectic, nervous, bilious, inflammatory,* &c., have also been applied to particular varieties of fever, and names indicative of certain cutaneous appearances connected with them have been given to others; as *scarlet* fever, *yellow* fever, &c., from the color of the skin in those diseases.

The usual symptoms of incipient fever are chilliness, quick pulse, hot and dry skin, languor, depression of spirits, alternate fits of shivering and heat, hurried and uneasy respiration, flying pains in various parts of the body, as the head, back, and loins; loss of appetite, nausea or vomiting; dry mouth, furred tongue, costiveness, urine small in quantity, and usually of a deep color, &c. When any of these symptoms appear, their progress may often be arrested by the timely exhibition of an emetic, followed by a saline purgative, and diaphoretics; at the same time promoting the action of these remedies by a low diet and drinking *copiously* of diluents, and carefully avoiding animal food, spirits, fermented liquors, or any thing at all stimulant. Whenever symptoms of fever become established, medical advice should be sought and implicitly followed.

In visiting or attending persons laboring under fevers, it is advisable to avoid immediate contact with themselves or clothing, or standing near them in such a position as to inhale their breath, or the effluvia evolved (in some cases) by their bodies; and when remaining for some time in the apartment, it is preferable to sit or stand near the fireplace, or between the window and door, as in such parts ventilation is most perfect. The greatest purifier of the atmosphere of a room is a good fire, because it occasions a continual current of the impure air up the chimney, and a corresponding influx of fresh air from without. *Chloride of lime,* or its solution, is also a good purifier of the atmosphere of a sick chamber, but should not be used in quantity, as the evolved chlorine might, in that case, impede the respiration of the patient. A small quantity of the powder spread on a flat dish or plate, and placed on the chimney piece, and a like quantity in an opposite part of the room, will continue to evolve sufficient chlorine to disinfect the air of an apartment for a week or longer. The evolution of chlorine is promoted by occasionally renewing the exposed surface, by stirring it with a piece of stick, and after it becomes scentless, by the addition of a little acid, as strong vinegar,

or spirits of salts or oil of vitriol, largely diluted with water. It is advisable to avoid entering the room of a patient laboring under contagious diseases, when the stomach is empty, or the spirits depressed; and it has been recommended to clear the mouth of the saliva immediately after quitting the chamber.

FIBRINE. A peculiar proteine substance, forming the coagulable portion of fresh-drawn blood, and the principal constituent of the muscular or fleshy parts of animals. It also occurs in vegetable juices, the gluten of wheat, and in the seeds of the cereals generally. It is eminently nutritious, and capable of yielding in the animal body, albumen, caseine, and the tissues derived from them. (Liebig.) It is a modification of proteine, and as such contains in itself the elements of all the softer portions of animals, and is hence capable of supporting life without the addition of any other aliment. This is what no other substances but albumen and caseine (also modifications of proteine) can do.

FILICINA. *Syn.* FILICIA. A peculiar substance, possessing alkaline properties, discovered by Batso in the rhizomes of the male shield-fern, (Aspidium filix mas.)

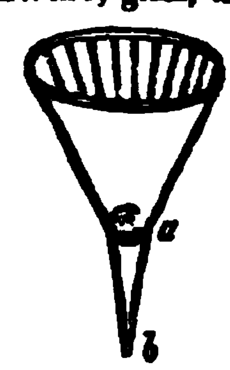
FILTER. *Syn.* FILTRUM, (*Lat.*) FILTRE, (*Fr.*) An instrument for filtering or straining.

FILTRATION. *Syn.* FILTRIREN, (*Ger.*) FILTRATION, (*Fr.*) FILTRATIO, (*Lat.*, from *filtrum*, a filter.) The separation of liquids from substances mechanically suspended in them, by passing them through the pores of media sufficiently fine to retain or keep back the solid matter. Filtration is one of the most common and useful chemico-mechanical operations of the arts, but under some circumstances, requires considerable address for its successful performance. It is usually resorted to for the purpose of freeing fluids from feculence, dirt, and other foreign matter, and for obtaining them in a clear or transparent state; but, in some cases, it has for its object the collection of the suspended substances, as precipitates, &c., and in others both these intentions are combined. The word *filtration* is absolutely synonymous with *straining*, but, in the language of the laboratory, the *former* is usually applied to the operation of rendering liquids transparent, or nearly so, by passing them through *fine* media, as filtering paper, for instance; the latter to the mere separation of the grosser portion, by running them through *coarse* media, as flannel, horse-hair cloth, &c., through which they flow with considerable rapidity. *Filtration* is distinguished from *clarification*, by the *former* removing the solid matter, or cause of opacity or foulness, by mere mechanical means, whereas the *latter* consists in the clearing of a liquid by depuration, or the subsidence of the suspended substances or fæces, arising from their gravity being naturally greater than the fluid with which they are mixed, or being rendered so by the application of heat, or the addition of some foreign substance.

The apparatus, vessels, or media, employed for filtration, are called *filters*, and are commonly distinguished from *strainers* by the superior fineness of their pores, as above noticed.

Both strainers and filters act on the same principles as the common sieve on powders; they all, in like manner, retain or hold back the coarser matter, but permit the liquid, or smaller and more attenuated particles to pass through. The term *medium* has been applied to the substance through the pores of which the liquid percolates.

The forms of filters, and the substances of which they are composed, are various, and depend upon the nature of the liquids for which they are intended. On the small scale, funnels of tin, zinc, copper, Wedgewood ware, earthenware, glass, or porcelain, are commonly employed as the containing vessels. (See engraving.) The filtering medium may be any substance of a sufficiently spongy or porous nature to allow of the free percolation of the liquid, and whose pores are, at the same time, sufficiently fine to render it limpid or transparent. Unsized paper, flannel, linen, calico, cotton-wool, felt, sand, coarsely-powdered charcoal, porous stone or earthenware, and numerous other substances of a similar kind, are employed for this purpose.

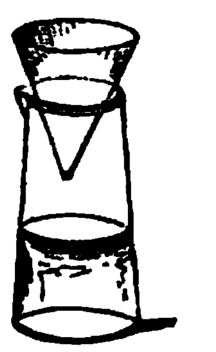


For many liquids that easily filter, and whose suspended matter is of a coarse and porous nature, it is sufficient merely to place a little cotton wool or tow, or a small piece of sponge in the neck of a funnel, as at (*a*) in the above engraving; but such materials, from the small extent of the filtering surface, soon get choked up. Filters of unsized paper are well suited for all liquids that are not of a corrosive or viscid nature, and are universally employed for filtering small quantities of liquids in the laboratory. A piece of the paper is taken of a size proportionate to the quantity of the substance to be filtered, and is first doubled from corner to corner into a triangle, (see eng.,) which is again doubled into a smaller triangle, and the angular portion of the margin being rounded off with a pair of scissors, constitutes a paper cone, which is placed on a funnel, and nearly filled with the liquid. A piece of paper so cut, when laid flat upon a table, should be nearly circular. Another method of forming a paper filter, preferred by some persons, is to double the paper once, as above, (see fig. 2,) and then to fold it in a similar way to a fan, observing so to open it and lay it on the funnel, that a sufficient interval be left between the two, to permit of the free percolation of the liquid. (See eng.)

To promote the same object, a funnel should be deeply ribbed inside, or small rods of wood or glass, or pieces of straw, or quills, should be placed between it and the paper. The neck of a funnel should also be deeply ribbed or fluted outside, to permit of the free passage of the air, when it is placed in a narrow-mouthed bottle or receiver. Without this is the case, the filtration will proceed but slowly, and the filtered liquid will be driven up the outside of the neck of the funnel by the confined air, and will be continually hissing and flowing over the mouth of the vessel. The breadth of a funnel, to filter well, should be about three

fourths of its height, reckoning from the throat *a*. When *deeper*, the paper is liable to be continually ruptured from the pressure of the fluid; and when *shallower*, filtration proceeds slowly, and an unnecessarily large surface of the liquid is exposed to evaporation. To lessen this as much as possible, the upper edge of the glass is frequently ground perfectly smooth, and a piece of smooth plate-glass is laid thereon. When paper filters are of large dimensions, or for aqueous fluids that soften the texture of the paper, or for collecting heavy powders, or metallic precipitates, it is usual to support them on linen or calico, to prevent their breaking. This is best done by folding the cloth up with the paper, and cutting the filter out of the two, in the same way as would be done with doubled paper, observing so to place it in the funnel that the paper and calico may remain close together, especially towards the bottom.

The filtration of small quantities of liquids, as in chemical experiments, may often be conveniently performed by merely placing the paper on the circular top of a recipient, as in the engraving; or on a ring of glass or earthenware laid on the top of any suitable vessel. A filter of this kind that will hold one fluid ounce, will filter many ounces of some liquids in an hour.



Good filtering paper should contain no soluble matter, and should not give more than $\frac{1}{250}$ to $\frac{1}{230}$ of its weight of ashes. The soluble matter may be removed by washing it, first, with *very dilute* muriatic acid, and secondly, with distilled water.

For filtering a larger quantity of a liquid than can be conveniently managed with a funnel, and also for substances that are either too viscid or too much loaded with feculence to allow them to pass freely through paper, conical bags made of flannel, felt, twilled cotton cloth or *Canton* flannel, linen, or calico, and suspended to iron hooks by rings or tapes, are commonly employed. The first two of the above substances are preferable for saccharine, mucilaginous, and acidulous liquids; the third for oily ones; and the remainder for tinctures, weak alkaline lyes, and similar solutions. These bags have the disadvantage of sucking up a considerable quantity of the fluid poured into them, and are therefore objectionable, except for large quantities, or when continued in actual use as filters for some time. On the large scale, a number of them are usually worked together, and are generally enclosed in cases to prevent evaporation, and to exclude dirt from the filtered liquor that trickles down their outsides; some of these arrangements will be noticed farther on.

A very simple mode of filtering aqueous fluids, which are not injured by exposure to the air, is to draw them off from one vessel to another, by means of a number of threads of loosely twisted cotton or worsted, arranged in the form of a syphon. (See the figure in the margin.) The little cotton rope at once performs the operations of decantation and filtration. This method is often convenient for sucking off the water from small quantities of precipitates.

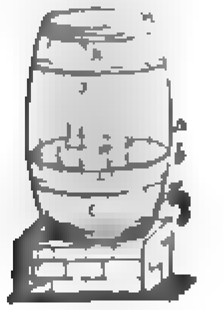
When solid substances, as porous stone or earthenware, are used as the media for filtration, vessels of metal, wood, or stoneware, are employed to contain them and the supernatant liquid. In these cases, the filtering medium is usually arranged as a shelf or diaphragm, and divides the vessel into two compartments; the upper one being intended to contain the dirty liquid, and the under one to receive the same when filtered. Such an apparatus is set in operation by merely filling the upper chamber, and may at any time be readily cleaned out by reversing it, and passing clean water through it in an opposite direction. When pulverulent substances, as *sand, coarsely-powdered charcoal*, &c., are employed, a similar arrangement is followed; but in this case, the shelf or diaphragm must consist of any convenient substance pierced with numerous holes, over which must be placed, first a stratum of coarse pebbles, next some of a finer description, and on this a proper quantity of the sand, charcoal, or other medium. Over the whole should be placed another layer of pebbles, or a board or plate of metal or earthenware, pierced with a number of holes, to allow the liquid to be poured into the filter without disturbing its *arrangement*. Apparatus of this kind of a permanent description, and arranged for filtering large quantities of liquids, are properly denominated "*filtering machines*."

Among the liquids usually submitted to filtration, the following may be mentioned as the principal: *water, oils, sirups, tinctures, vegetable juices, infusions, and decoctions.*

The *water* of our wells is presented by nature ready filtered to the hand of man, and often exhibits a desirable degree of transparency and purity. It acquires this state by percolating through the mineral strata of the earth, which deprive it of the organic matter it derives from the soil and subsoil, but, at the same time, it dissolves a portion of the saline and earthy media through which it passes, and hence acquires that peculiar "hardness" which is constantly found in spring water. On the large scale, this natural system of filtration has been imitated by some of the commercial companies that supply our cities and towns with water. Extensive beds of sand and gravel have been employed, with variable success, as the filtering media, and were it not that filters gradually lose their porosity by the accumulation of the retained matter in their pores, such a method would be excellent. But the great expense of such filters precludes the possibility of frequently cleaning or renewing them, by which means they can alone be kept in an efficient state. A filter that appears to possess the advantages of being easily and cheaply cleaned when dirty, and which filters water in the most perfect manner, and with immense rapidity, may be formed by placing a stratum or sponge between two perforated metallic plates, united by a central screw, and arranged in such a manner as to permit of the sponge being compressed to any required degree. Water, under gentle pressure, flows with such rapidity through the pores of compressed sponge, that it is said that a few square feet of this substance will perfectly filter several millions of gallons of water per day

This method of filtration has been made the subject of a patent, and has been favorably noticed by the legislature.

A few barrels or hogsheads of water may be easily filtered daily, by the arrangement represented in the engraving.



A, A common water-pipe, or cask.
b, A false bottom, fitting in perfectly water-tight.
c, A perforated wooden or metallic vessel or box, covered with a bag of felt, or other filtering substance, (not shown in the engraving.) *d*, A small tube, fitting water-tight into the false bottom, and uniting the *interior* of the filter with the lower portion of the cask.

It is evident that when water is poured into the upper portion B, of a vessel so arranged, it will sink through the filter *c*, and pipe *d*, into the lower chamber C, and this filtration will go on as long as the supply continues, and water is drawn from the cock *e*. By uniting the cock *e* with a tank or casks, and by keeping the upper portion B always full by means of a ballcock, a considerable quantity of water may be thus filtered. The advantage of this plan is, that the filter *c* can be always readily got at, and easily cleaned or renewed. For filtering water on the small scale, or for domestic use, alcarrhazas or porous earthenware, filtering-stone, and layers of sand and charcoal, are commonly employed as the filtering medium. The filtering power of the first two may be greatly increased by adopting the arrangement represented in the margin, which consists in making the diaphragm of the shape of a disc, (*d*,) supporting plates of the same material, the whole forming but *one* piece.

The platylithic water-filters, which are formed of porous stone cut on this plan, present 200 to 300 square inches of filtering surface, and may be purchased at from 9*s*. to 13*s* 6*d*. each. They are perhaps the best portable filters made; they impart great brilliancy to the water, and filter rapidly. The portable artificial filters, set up in stone-ware, that are commonly sold in the shops, contain a stratum of sand, or coarsely-powdered charcoal; before, however, having access to this, the water has to pass through a sponge, to remove the coarser portion of the impurities.

Filtering bag of cotton cloth.

Canvas filtering-bag, "creased," 3 or 4 inches in diameter, enclosing the filtering bag, ready for fixing.

Oils are filtered, on the *small scale*, through cotton-wool, or unsized paper, arranged in a funnel; and on the *large scale*, through long bags, made of twilled cotton-cloth, (Canton flannel.) These bags are usually made about 12 or 15 inches in diameter, and from 4 to 8 feet long, (see engraving,) and are enclosed in bottomless casings, or bags, of coarse canvass, about 5 or 6 inches in diameter, for the purpose of condensing a great extent of filtering surface into the smallest possible space. A number of these double bags (from 1 to 50 or 60) are connected, with corresponding holes, in the bottom of a block-tin, or tinned-copper cistern, into which the oil to be filtered is poured. The mode in which these bags are fastened to the cistern is of the utmost importance, as on the joint being close and secure depends the integrity of the apparatus. Three methods of doing this are figured in the engraving, which, with the references, will explain themselves, the same letters referring to the same parts of each.

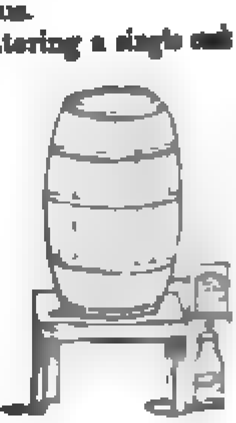
a, Bottom of cistern.
b, Filtering bag.
c, Screw of the conical nozzle fitting into the cistern.
d, Binding cord connecting the bag and nozzle.
e, Binding cord connecting bag and lower nozzle.
f, Bayonet-catch, connecting the lower portion of the nozzle fastened to the bag with the upper and fixed part, *g*.
i, The thick hem at the top of the bag, (purposely made large by enclosing a piece of thick cord therein,) resting on the shoulders, *k*.
l, A metallic cylinder, loosely fitting the hole in the cistern, and over which the top of the bag is drawn, before being put into its place; when fitted, as in the engraving, it retains the hem *i* securely in its place above the shoulder *k*.

The second is the least expensive, and certainly the most convenient method, and when the cylinder *l* fits the hole closely, (allowing for the bag,) it is as safe, or safer, than an ordinary screw.

The bags are surrounded by a wooden screen furnished with doors for the purpose of keeping off the dust, and the bottom of the apartment is furnished with large steam-pipes, by which a proper temperature may be kept up in cold weather. In practice it is more convenient to have a number of small cisterns at work, (say 50 or 100 gallons each,) than one or two larger ones; as any accident that may occur is more easily remedied, and that without stopping the whole operation.

When cotton cloth bags are employed without being *creased*, or enclosed in others of canvass, they should not be longer than about 3 or 4 feet, and not wider than about 5 or 6 inches when filled. When larger they are dangerous.

A convenient method of filtering a single cask of oil is to insert the pipe of one of Beart's patent filters into the cork-hole, by which means the whole will be filtered as drawn off, without any trouble on the part of the operator.



The filter consists of a porous bag stretched over a perforated metallic vessel, nearly the shape and size of the exterior casing, and its edge is tightly screwed between the sides and bottom of the latter, so as to be quite water-tight. The cock communicates with the interior of the perforated plate and filter, and the supply-pipe and the exterior. By this means the interior chamber, which occupies five-sixths of the vessel, rapidly fills with filtered oil, and continues full as long as any liquor remains in

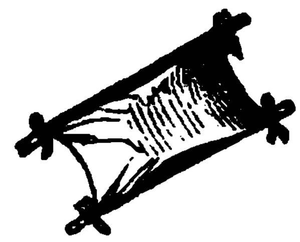
the cask. This arrangement is also well adapted to the filtration of wines, beer, cordials, porter, and various other liquors. It is unequalled in simplicity.

The filtration of sirups is now generally effected on the large scale by passing them through the "*creased bag filter*" just described. On the small scale, as by confectioners and druggists, they are usually passed through conical flannel bags. The filtration of thick sirups is, however, attended with some difficulty, and it is therefore a good plan to filter them in a somewhat dilute state, and afterwards to reduce them to a proper consistence by evaporation in clean vessels of tinned copper, by steam heat. Sirups, when filtered in a heated state, run well for a time, but the pores of the bag rapidly get choked, from the thickening of the sirup and partial crystallization of the sugar, occasioned by the evaporation of the aqueous portion from the surface of the bag. This may be partially prevented by enclosing the bag in a metallic casing. On the whole, clarification is preferable for sirups to filtration, on the small scale. They need only to be well beaten up while cold with a little white of egg, and then heated; a scum rises which must be removed as soon as it becomes consistent, and the skimming continued until the liquid becomes clear. Any floating portions of scum that may have escaped notice are easily removed by running the sirup through a coarse flannel strainer, while hot. The most extensive application of the process of filtration in the arts is in the refining of sugars.

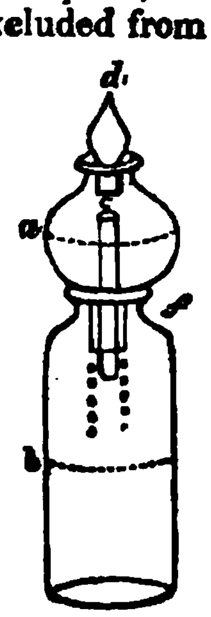
Tinctures and dilute spirits are usually filtered through bibulous paper placed on a funnel, or through *thin* and fine cotton bags. In general, tinctures clarify themselves by the subsidence of the suspended matter, when allowed to repose for a few days. Hence it is the bottoms alone that require filtering; the supernatant clear portion need only be run through a small hair sieve, a piece of tow or cotton placed in the throat of a funnel, or some other coarse medium, to remove any floating substances, as pieces of straw, &c. *Spirits* largely loaded with essential oil, as those of aniseed, &c., run rapidly through paper or calico but usually require the addition of a spoonful or two of magnesia before they will flow *quite* clear. When possible, tinctures, spirits, and all similar volatile fluids, are better cleared by subsidence or clarification than by filtration, as, in the latter way, a portion is lost by evaporation.

Vegetable juices should be allowed to deposite their feculous portion before filtration. The supernatant liquid will then be often quite clear, but if not so, may be readily filtered. If the quantity be small, paper supported on a piece of *coarse* calico placed on a funnel is the best medium; if large, one of the conical bags before described. The bottoms from which the clear portion has been decanted, should be placed on a separate filter, or else added after the whole of the latter has drained through. Vegetable juices are often rendered clear by simply heating them to about 180° or 200° Fahr., by which their albumen is coagulated; they are also frequently clarified by the addition of a little white of egg and heat, in the same way as sirups; but many of them (as those of hemlock, henbane, aconite, &c.) are injured by heat, and must consequently be filtered. In all cases they should be exposed to the air as little as possible, as they rapidly suffer decomposition.

Vegetable infusions and decoctions may be cleared by defecation followed by filtration. The conical bags of flannel before described are usually employed for this purpose. When the liquid is to be evaporated to an extract, they are commonly suspended by a hook over the evaporating pan. A convenient method of straining these fluids is to stretch the square of flannel on a frame or 'horse,' securing it at the corners by pieces of string, (see eng.) Such a frame may be laid across the mouth of a pan, and is more easily fed with fresh liquid than a bag, whose mouth is 30 or 40 inches higher. The same purpose is effected by laying the flannel across the mouth of a coarse hair sieve. The *concentrated infusions* and *decoctions*, being usually weak tinctures, may be filtered in the same way as the latter. (See *tinctures*, above.) Many vegetable solutions, that from the viscidity of the suspended matter can scarcely be filtered, may be readily clarified with white of egg in the cold, or pass the filter rapidly, if a *very small quantity* of sulphuric, or other strong acid, be previously added. (See the latter part of the article BREWING.)



Corrosive liquids, as strong acids, are filtered through powdered glass, or silicious sand, supported on pebbles in the throat of a glass funnel, or through asbestos placed in the same manner. Charcoal has also been employed for the same purpose, but is not fit for some acids. Strong caustic alkaline lyes are also filtered through powdered glass or sand. Weak alkaline lyes may be filtered through fine calico, stretched across the mouth of a funnel. Many corrosive liquids, as liquor of potassa, &c., require to be excluded from the air during filtration. The simplest apparatus that can be employed for this purpose is that figured in the margin: *a* is a globular bottle fitted with the ground stopper *d*, and having a perforated neck *f* ground to the bottle *b*; *c* is a small tube, wrapped round with as much asbestos, linen, or calico as is required to make it fit the under-neck of the bottle through which it passes. The tube *c* may also be fixed by placing pebbles and powdered glass or sand round it, as before described. For use, the solution to be filtered is poured into the bottle *a* nearly as high as the top of the tube *c*, and the stopper placed in. The liquid then descends into *b*, and a similar quantity of air passes up the tube into *a*. The liquor potassæ P. L. may be always obtained fine by depuration and filtering the sediment of lime through calico fixed across the mouth of a funnel.

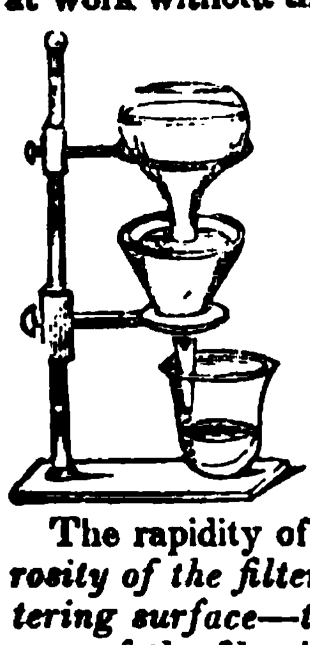


When precipitates, or the suspended matter, is the object of the filtration, the filter should be of such a nature that the powder may be easily separated from it when dry, and that without much loss. Linen filters are for this reason preferable for large quantities, and smooth bibulous paper for small ones. The powder should be washed down

the sides of the filter, and collected, by means of a small stream of water, in one spot at the bottom, and, when dry, should be swept off the paper or cloth with a camel-hair brush, and not removed by a knife, as is commonly done, unless it be of a very adherent kind.

The first portion of liquid that runs through a filter is commonly foul, and should be pumped back or returned until it runs *clear*, when it may be caught in a proper receiver. In many cases, the liquid will not readily become transparent by simply passing through the filter; hence has arisen the use of filtering powders, substances which rapidly choke up the pores of the media in a sufficient degree to make the fluid pass clear. See POWDER. These powders should not be in too fine a state of division, nor used in large quantities, as they then wholly choke up the filter, and absorb a large quantity of the liquid. For some liquids, these substances are employed for the purpose of *decoloring* or *whitening* them. In such cases, it is preferable, first to pass the fluid through a layer of the substance in coarse powder, from which it will run but slightly contaminated into the filters; or, if the substance be mixed with the whole body of the liquid, to pass it through some coarser medium, to remove the cruder portion before allowing it to run into the filter. Granulated animal charcoal is used, according to the first method, to decolor sirups, oils, &c.; and filtering powder by the second, to remove a portion of the color, and to clarify castor oil. The common plan of mixing large quantities of filtering powder with this oil, and throwing the whole into the filter, as adopted by the druggists, is injudicious. When *simple filtration* is required, it is better to use but *little* or no powder, and to continue returning the oil that runs through until it filters quite clear. By this plan the same filters may be used for a long period of time, and will continue to work well; but by the usual method, they rapidly decline in power, and soon scarcely deliver their contents at all.

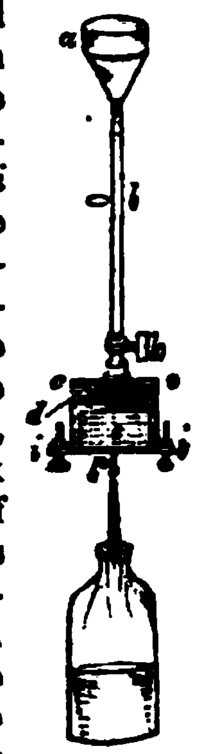
It is often of great advantage to render a filter self-acting, or to construct it in such a way that it may feed itself, so that it may continue full and at work without the constant attention of the operator.



On the *small scale*, this may be readily effected on the principle of the common fountain lamp, (see eng.;) and on the *large scale*, by placing the vessel containing the unfiltered liquid on a higher level than the filter, and by having the end of the supply-pipe fitted with a ballcock, to keep the liquid in the filter constantly at the same height.

The rapidity of filtration depends upon the *porosity of the filtering medium—the extent of filtering surface—the relative viscidity or limpidness of the filtering liquid, and the porosity and fineness of the substances it holds in suspension.* The most efficient filter is produced, when the first two are so graduated to the latter, that the liquid filters rapidly, and is rendered perfectly transparent.

To the preceding causes that influence filtration may be added the *pressure* or force by which the liquid is impelled through the pores of the filter. In the common method of filtration no pressure is exerted beyond that of the weight of the column of the liquid resting on the filtering medium, but in same cases additional pressure is employed. This is done for the purpose of producing more rapid filtration, or for filtering liquids that, from their viscidity, will scarcely pass through the pores of substances sufficiently fine to remove their foulness in the ordinary way. One of the easiest means of employing pressure in filtration is to increase the height of the column of the filtering liquid. From the peculiar properties of fluids, by which they transmit pressure in all directions, this column need not be of equal diameter throughout, but may be conveniently contracted to the size of a small pipe, as in the accompanying engraving, which represents a small filter on this construction at work. *a* is the funnel or reservoir of foul liquid;

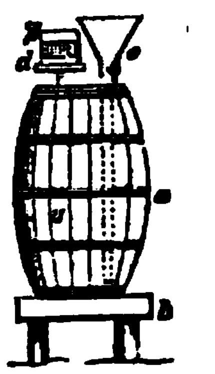


b a small pipe conveying the liquid to the filter; *c c* a chamber, of which the upper portion *d* is filled with the descending liquid, and the lower portion *e* with the filtering media; *i i* are screws by which the bottom plate is fastened on; which plate is removed to clean out or renew the filter. For use, the cocks *k* and *l* are closed, and the liquid poured into the funnel *a;* the cock *k* is next opened, and, in a few minutes after, the cock *l*, when an uninterrupted flow of filtered liquor will be obtained as long as any fluid remains in the funnel *a*, and the tube *b*. The length of the latter determines the degree of pressure. Care must be taken to pass the foul liquid through a hair sieve, or some other strainer, to remove any substance that might choke up the pipe *b*. Another mode of employing pressure in filtration is the withdrawal of the air from the receiving vessel, as in the *vacuum filter*, by which a pressure of about 14½ lbs. to the inch becomes exerted on the surface of the liquid by the atmosphere. The vacuum in the receiving vessel may be produced by the air-pump or by steam. (See CONGELATION.) A commoner method of applying pressure than the last is to condense the air over the surface of the liquid by means of a forcing-pump, or by steam. On the small scale, pressure may be applied to filtration, by employing a syphon, whose shorter leg has its mouth blown into the shape of a bell or funnel, over which filtering paper or fine calico may be stretched.

The application of pressure to filtration is not always advantageous, and beyond a certain limit, becomes objectionable. It is found in practice that fluids under pressure take a longer period to run clear than without pressure, and that ruptures of the media more frequently take place with the *former* than the *latter*. Great pressure is in no case advantageous.

The filters already noticed are those that act by the fluid descending through the media; but in some cases, the reverse method is employed, and the liquid filters upwards, instead of downwards. These are called *ascending filters*, and are often

preferable to those on the descending principle, because the suspended matters that require removal by filtration usually sink, and thus a portion escapes being forced into the pores of the filter. They are also more convenient, when pressure is employed. Their construction depends upon the same principles as the common filter, and merely requires that the feeding vessel should be higher than the upper surface of the filtering media. *Oils* are conveniently filtered in this way, because of their little specific gravity. By fixing a small filter on this principle into the head of a cask, and pouring in water through a funnel, whose neck reaches nearly to the bottom of the cask, the oil will float up and pass the filter, leaving the sediment behind. In cold weather, hot water may be employed.



a, Cask of oil. *b*, Stand. *c*, Funnel for water. *d*, Filter.

In some cases, the upward and downward systems of filtration are united in the same apparatus, and this method is advantageous where room is an object. For this purpose, it is merely necessary to connect the bottom of an ascending filter with the top of a descending one, or the reverse; the proper pressure being in either case applied. (See Clarification, Defecation, &c.)

FININGS. A solution of gelatin, used to clarify beer, wine, &c.

Prep. Isinglass (ordinary) 1 lb.; stale beer, cider, or vinegar, 3 or 4 pints. Mix, and macerate until the former becomes gelatinous, then reduce it to a proper consistence with weak, mild beer, cider, or any other liquid that the finings are intended for.

Remarks. A pint, or more, is the usual dose for a barrel of beer or porter, and a quart for a hogshead of wine. (See the latter part of the article Brewing.)

FIRE EATING. The power of resisting the action of fire is given to the skin, by frequently washing it with diluted sulphuric acid, until the part becomes sufficiently callous. It is said that the following mixture is very efficacious:—dilute sulphuric acid 3 parts; sal ammoniac 1 part; juice of onions 2 parts; mix. It is the acid, however, that produces the effect.

FIREPROOF STUCCO. *Prep.* Moist gravelly earth, (previously washed,) made into stucco with the following composition:—pearlashes 2 parts; water 5 parts; common clay 1 part; mix.

Remarks. This is said to cost about 1*s.* 6*d.* per hundred square feet. It has been tried on a large scale and found to answer well. It is used for wood, &c.

FIRES. Our notice of this subject must necessarily be limited, for want of space. Fires are but too frequently said to arise by accident, which is merely a condensed phrase, equivalent to *carelessness* and *recklessness*. There are few fires that might not have been prevented by the exercise of *common prudence*, and a vast number that have been caused by *negligence*, arising from sheer *laziness*. As familiar instances may be mentioned, the permitting of sparks to fall on the ground and remain there, without extinguishing them; carrying a *naked* candle into rooms containing inflammable substances, &c.

Prev. 1. Avoid leaving your candle burning at the side of your bed, but place it on a table or the floor, at a respectable distance from any article of linen, or other equally inflammable substances. *Rush, wax, or floating lights* are the safest for night burning. The practice of reading in bed cannot be too much censured; it is a common cause of fires. 2. Never set aside a bucket or box containing hot ashes, or cinders, in a closet. 3. Never throw a piece of lighted paper, cigar, or other ignited substance, on the floor; and should such fall by accident, immediately extinguish them by treading on them. 4. Never blow gas-lights out, but always extinguish them by turning off the supply. 5. Should the smell of gas be strongly perceived, immediately turn off the cock at the meter, and avoid carrying a lighted candle into the part where the escape has taken place, before the gas has been removed by thorough ventilation; attention to this point will prevent the possibility of an explosion. 6. Have your chimneys kept in a clean state by frequent sweeping.

Fires might often be readily extinguished when first discovered by the timely application of a few buckets of water. When an apartment is discovered on fire, the door, chimney, and windows should be immediately closed, if possible, and only opened for the purpose of projecting water on the flames. By this means the supply of air will be cut off, and rapid combustion prevented. The neglect of this precaution has often caused a mere smouldering fire, that might have been easily put out, to burst into an inextinguishable mass of flame. It has been proposed to add common salt or pearlash to the water thrown on fires, as even a weak solution of those substances speedily stops combustion. Such a plan is very plausible, and may easily be applied, by adding the saline matter to the buckets of water used to feed the engine for the first few minutes of its working; but when a fire has acquired any extent, the action of such substances becomes scarcely perceptible.

Fires on board ships. The extinction of fires at sea, by means of carbonic acid gas, has been suggested to the Admiralty by Mr. J. R. Hancorn, surgeon. He says—"The antidotal effects of *carbonic acid gas* upon combustion are well known to every experienced chemist; and I am convinced, by practical experiments, that a simple and economical apparatus might be attached without inconvenience to every decked vessel. Carbonic acid gas is a well-known non-supporter of combustion, and will *extinguish fire at the very instant of coming in contact* with burning matter. Chalk will yield, with sulphuric acid, (vinegar, or any other acid will do,) 44 per cent. of the gas: hence, a ton of chalk, and a fourth part of that quantity of sulphuric acid, will be found sufficient to extinguish any fire on board a ship *The plan is peculiarly adapted to a ship, because she can be battened down so as to exclude the atmosphere.* A small leaden gasometer is all the apparatus required, having a curved tube, and which, being portable, may be placed over the burning part, while a hole may be cut in the deck sufficiently large to admit the tube. Carbonic

acid gas *expands with heat*, and being *heavier* than the atmosphere or smoke, immediately *descends, by its own gravity*, upon the burning mass. I may further mention the utility of the apparatus in destroying vermin in ships, such as rats and cockroaches, being more easily applied, and more effectual, than the usual method." (Chemist, iii. 279.) This plan has been rejected by the Admiralty because of the destructive action of the gas on human life, as well as on fire. But "it surely is possible by mechanical means to expel the gas before again entering the ship's hold. At any rate, the grand point would be obtained of extinguishing the fire—though the crew might have only the *deck* to stand on. The frequency of these disasters has become distressing." (Ed. of the Chem.)

Escape from apartments on fire may generally be readily effected by creeping on the hands and knees. In this way the window or door may be reached. It is found that the atmosphere of a room so full of smoke as to produce suffocation to a person standing upright, may generally be safely breathed, on nearly a level with the floor. Should descent by the staircase be found impossible, then the window should be immediately sought. Here *presence of mind* is of the utmost importance. If a ladder or fire-escape be not provided by those without, a rope should be made by tying the sheets and blankets of the bed together, one end of which should be firmly secured to a chair, table, or preferably one of the bedposts, and with this apparatus descent should be cautiously attempted. Jumping out of the window should be avoided, as persons who have not been brought up as clowns or harlequins, run just as much danger in performing such an exploit as they do by remaining in the burning building. Persons have frequently lost their lives by hastily throwing themselves out of window, under the dread of being burnt alive, who would have been rescued by those without, had they waited but a few moments longer. When it is impossible to escape from a burning building by the stairs or windows, retreat may be sometimes secured by a trapdoor opening on to the roof, or by a skylight, when, unless it be an isolated house, the roof of one of the adjoining buildings may probably be gained with safety, provided common caution be observed.

Fire-escapes of various kinds have been invented of late years, and employed with indifferent success at many fires in the metropolis. Of these, the one that has been most generally approved of, is that invented by Captain Manby, consisting of a stout rope furnished with nooses, distended by flat rests for the feet, at convenient distances for stepping from one to the other. The one end of this rope is provided with a stout hook, or grappling-iron, by which it may be fastened to the sill of a window, post of the bedstead, or any other convenient object. By means of this apparatus a descent may be safely made from a considerable height. To avoid the risk of this *escape* catching fire, it has been proposed to make it of iron chain; but it thus becomes heavy and inconvenient. The best plan is to imbue the rope with some substance that will render it incombustible; mere water would be sufficient.

It is said that there is no instance on record of a person being burnt to death in dwelling-houses in *Edinburgh*, where the houses are usually high; yet in *London*, where fire-engines and fire-escapes are provided in greater numbers, deaths are frequent from this cause. The reason of this difference is, that in the former city, the stairs are all of *stone*, by which means a road of escape is secured.

The clothes of females and children, when on fire, may be most readily extinguished by rolling the sufferer in the carpet, hearth-rug, table-cover, a great-coat, cloak, or any other woollen article at hand. If this be expertly done, the flames will be rapidly put out. Should assistance not be at hand, the person whose clothes are on fire should throw herself on the ground, and roll the carpet round her, as before described; or if such a thing is not in the room, she should endeavor to extinguish the flames with her hands, and by rapidly rolling round and round on the floor. In this way the fire will be stifled, or at least the combustion will proceed so slowly that less personal injury will be experienced before assistance arrives. But if, on the contrary, the party whose clothes are on fire remains in an upright position, the flames will naturally ascend, and scorch the face, and other unprotected parts of the body. The advantage of assuming the horizontal position is also manifest from the fact, that *nine* times out of *ten* it is the lower parts of the dresses of females that first catch fire. A lady's muslin dress taking fire at the skirt would burn from bottom to top, and produce a fatal density of flame in half a minute, while she is standing upright; but when lying down, even though she took no pains leisurely to extinguish the flames, ten minutes would probably elapse before it would be consumed, and the flame might at any instant be extinguished by the thumb and fingers. It merely requires the exercise of ordinary presence of mind. (See ACCIDENTS.)

The addition of ½ oz. or 1 oz. of alum or sal ammoniac to the last water used to rinse a lady's dress, or a less quantity added to the starch used to stiffen it, would render it uninflammable, or at least so little combustible that it would not *readily* take fire; and if it did, would be *slowly* consumed *without* flame. Had this precaution been adopted, the late lamentable accident at one of our national theatres might have been avoided. (See CLOTH, INCOMBUSTIBLE.)

It is often difficult to get horses out of buildings on fire, but it is said that they will readily come out if the saddle and bridle, or harness to which they are accustomed, be thrown over them as usual.

FISH. *Syn.* PISCIS, (*Lat.*) POISSON, (*Fr.*) Fish are a wholesome species of food, but are less nutritious than the flesh of animals, or the grains of the cereals. Of all the various substances used as aliments by man, fish are the most liable to run into a state of putrefaction, and should therefore be only eaten when perfectly fresh. Those that are the whitest and most flaky when cooked, as *whiting, cod, flounders, soles, haddock, turbot, hake*, &c., are the most easily digestible; and those abounding in oily matter, as *salmon, eels, herrings*, &c., are most nutritious, though more likely to offend the stomach. Salt-water fish has been said

to be more wholesome than river fish, but without sufficient reason. *Salted fish* is very hard of digestion, unless well cooked. The frequent use of fish as an aliment is said to promote the sexual feelings, but not the increase of population, unless a sufficiency of other food (animal) be taken at the same time. Skin diseases are also said to be more common among those who live continually on fish, but this probably arises from their use not being accompanied by a proper quantity of fresh vegetables. Fish consist of about 80% of water, 14% of albumen and fibrine, and 6% of gelatin, making about 20% of nutritive matter. (Brande.) Acid sauces and pickles are the proper additions to fish, from their power of retarding the progress of putrefaction, and of correcting the relaxing tendency of large quantities of oil and butter.

Caution. It sometimes happens that a fish-bone accidentally swallowed will remain in the œsophagus, and occasion serious inconvenience; in fact, instances have been known where so much irritation has arisen that death has followed. In such cases it is advisable, as soon as possible, to take four grains of tartar emetic, dissolved in ½ pint of warm water, and immediately afterwards the white of six eggs. The coagulated mass will not remain in the stomach more than two or three minutes, and the remedy has been known to "remove no less than 24 pins at once."

Choice, dressing, &c. "The flesh of any fish is always in the highest perfection, or in season, as it is called, during the period of the ripening of the milt and roe. After the fish has deposited the spawn, the flesh becomes soft, and loses a great deal of its peculiar flavor. This is owing to the disappearance of the oil or fat from the flesh, it having been expended in the function of reproduction." (Fleming's Phil. of Zoology.) Fish should be dressed as soon after being caught as possible, as much of their peculiar delicacy and flavor is lost by keeping, even for a few hours. Turbot and salmon are said by the fishmongers to be improved in flavor when two or three days old, but this is surely a mistake, as the former, when dressed immediately after being caught, possesses a fine creamy taste which it afterwards loses; while the latter, by the loss of a *single tide*, loses a portion of the fine white curd which intervenes between the flakes, and by longer keeping, this curd and the larger flakes disappear altogether. In the eyes of some epicures, the richness is, however, increased by this change. Mackerel and some other fish suffer so much from keeping only a few hours, that they become quite unwholesome. On this account the former are permitted to be publicly vended on Sundays. Herrings offer a remarkable example of the advantage of dressing fish as fresh as possible. When cooked soon after being caught, they possess considerable delicacy and flavor, but by keeping for only a few hours, the oil separates from the flesh, and they become soft, greasy, and strong-flavored.

In the choice of every kind of fish, stiffness, brightness of the eyes, and redness of the gills may be regarded as invariable signs of freshness. A peculiar elasticity will also be perceived in fish recently caught; little or no permanent impression being made by the ordinary pressure of the fingers, from the flesh immediately rising when the pressure is withdrawn. Fresh fish also lie in a partly curled position, and never quite straight, as is the case when they have been kept for some time Thickness and fleshiness are deemed marks of the good condition of all fish.

On the proper cleaning of fish preparatory to dressing it, depends much of its delicacy and flavor. Ordinary cooks seldom do this *well*, from not slitting the fish sufficiently open to permit the inside to be *thoroughly* washed, and seldom using sufficient water. The superior flavor of fish cleaned by the fishmongers arises from their performing the operation more completely, and from the large quantity of water they employ about them. The flavor of all fish is improved by adding a little salt or vinegar to the last water in which they are washed. The sound, milt, and roe should be carefully cleaned and preserved.

Fish is preferably cooked by simple *boiling*, *broiling*, or *frying;* in fact, the finer kinds of fish are often injured by the excessive interference of the cook. When boiled, the fish should be put on the fire in cold water, and as soon as a scum rises from boiling, it should be removed by the skimmer. The addition of a little salt or vinegar to the water improves the flavor of most fish, and renders the flesh firmer. Fish is known to be sufficiently dressed by the flesh in the thicker parts separating easily from the bone. When this is the case, it should be removed from the kettle, as by soaking in the water it loses its firmness. *Sole, skate*, and *mackerel* are usually put into boiling water. *Fish for broiling* should be well washed in strong vinegar, wiped dry with a towel, and floured before placing them on the gridiron; and the bars of the latter should be *hot*, and well buttered. *Fish for frying* should be prepared as for broiling; and the butter, oil, or lard should be allowed to boil for a minute or two before putting them into the frying-pan. The latter should be perfectly smooth and bright, and the butter or oil in abundance, to prevent the fish sticking to it and burning. When removed from the pan, the superfluous fat should be drained from them, preparatory to serving. When fish is divided into fillets or cutlets before being cooked, it is usual to take out the bones, and to dress it with forced meat, &c.

In serving fish of the finer kinds, no other additions are required than melted butter and the ordinary fish sauces and pickles. The dish should be garnished with *raw* parsley for the sake of appearance, but boiled parsley, chopped small, should accompany it. All kinds of fish should be served on a napkin.

Pres. Fish may be preserved in several ways:—

I. By either wet or dry salting.

II. By simply drying after cleaning them.

III By salting them and then drying them.

IV. By placing them in jars, pouring salad oil over them, and tying them over *air-tight*.

V. By dipping them into, or brushing them over with pyroligneous acid, and then drying them. This gives a smoky flavor, but if pure acetic acid (P. L.) be used, no taste will be imparted. It may be applied by means of a clean painter's brush, or even a stiff feather. A tablespoonful is sufficient to brush over a large surface. Fish and flesh so prepared will bear a voyage to the East Indies and back uninjured.

VI. Fish may be preserved in a living state for 14 days or longer without water, by stopping their mouths with crumb of bread steeped in brandy, pouring a little brandy into them, and then placing them in straw in a moderately cool situation. (Prechtl. Encycl. Techn.)

VII. Immersion of the *cleaned* fish in water holding in solution $\frac{1}{300}$ or $\frac{1}{400}$ part of creosote, and then drying them.

VII. Fish may be preserved in a dry state, and perfectly fresh, by means of sugar alone. Fresh fish may be thus kept for some days, so as to be as good when boiled as if just caught. If dried and kept free from mouldiness, there seems no limit to their preservation; and they are much better in this way than when salted. The sugar gives no disagreeable taste. This process is particularly valuable in making what is called *kippered salmon;* and the fish preserved in this manner are far superior in quality and flavor to those which are salted or smoked. A few tablespoonfuls of brown sugar are sufficient for a salmon of five or six pounds weight; and if salt be desired, a teaspoonful may be added. Saltpetre may be used instead, in the same proportion, if it be wished to make the kipper hard. (See Animal Substances used as Food.)

FIXATEUR. *Syn.* Bandoline. *Prep.* Soak Iceland moss in cold water for an hour or two, drain and dissolve in boiling water.

Remarks. A solution of gum arabic in water is also commonly called by the same name. It is used by ladies to make their hair curl firmly, and remain in any required position. It is applied by moistening the fingers, and passing the hair through them. Beer has a similar effect.

FLANNEL. It has been shown by the experiments of Count Rumford that the conducting power of the different materials employed for clothing varies considerably. A thermometer, surrounded with cotton-wool, and heated by immersion in boiling water, took 1046 seconds to lose 135°, when plunged into a bath of melting ice; but, under the same circumstances, when sheeps' wool was employed, 1118 seconds elapsed before a like sinking of the thermometer took place, (Phil. Trans. 1792;) thus showing the greater conducting power of the former, and consequently the superiority of the latter substance for the manufacture of warm clothing. But the chief advantage of wool as an article for under-clothing depends less upon its actual power of conducting heat than its peculiar texture. Flannel acts as a gentle stimulus on the skin, and exercises the most beneficial action, by keeping the pores clean, and in a state most favorable to perspiration. It has also the advantage of absorbing the perspiration as soon as emitted, and allowing its watery portion to pass off into the atmosphere almost as soon as formed, but this is not the case with cotton and linen fabrics. The different effects of flannel and linen are particularly perceptible during brisk exercise. When the body is covered with the former, though perspiration be necessarily increased, the perspired matter freely passes off through the flannel, and the skin remains dry and warm. If the same exercise be taken in linen shirts, perspiration, as in the former case, is indeed also increased, but the perspired matter, instead of being dispersed into the atmosphere, remains upon the linen, and not only clogs the pores of the skin, but gives a disagreeable sensation. From this property of flannel, persons who wear it next the skin seldom catch cold from changes of temperature, even though perspiring profusely; but in similar cases, when linen or calico shirts are worn, chilliness immediately comes on, followed by "*sniffling, sneezing*, and *cough*," and all the other symptoms of severe catarrh.

The common objections raised against the use of flannel are founded on vulgar prejudices, arising from ignorance, obstinacy, or bravado, and are undeserving of the notice of sensible people. In a fickle and moist climate like that of England, every person should wear a robe of flannel next the skin, or at all events a waistcoat of flannel reaching below the loins; and this should not be discarded as soon as the cold weather has passed, but its use should be continued all the year round; for in reality, flannel is, if possible, even more required in summer than in winter, because persons perspire more freely in hot than in cold weather, and are consequently more susceptible of cold, while at that period of the year their clothing is less capable of protecting them from the effects of sudden changes of temperature, and draughts of cold air, moisture, &c. Females, children, persons of delicate constitutions, and all others, who, from their habits of body or life, perspire freely, or are much exposed, should wear flannel.

In washing flannels, it is said they should be always put into scalding hot water, by which method their color will be preserved, and they will be prevented from shrinking.

FLASH. *Prep.* Burnt-sugar coloring 1 gall.; fluid extract of capsicum, or essence of cayenne, ½ pint, or enough to give a strong fiery taste.

Use. It is employed to color spirits, and to give them a false strength. It is made by the brewers' druggists, and vended under the name of "*isinglass and burnt sugar.*"

FLATULENCY. (From *flatus*, a blast.) A morbid collection of gas in the stomach and bowels. The most common cause of flatulency is indigestion. When the natural fluids of the stomach are secreted in a healthy state, they exercise an antiseptic and digestive action on the food, by which it is speedily reduced to a magma that is little liable to spontaneous change while in the body; but when the reverse is the case, fermentation rapidly commences, and the stomach and associated viscera become distended with gas, giving rise to frequent eructation and crepitation. The quantity of gas thus accumulated is often enormous. It is asserted that an ordinary apple during fermentation yields about 600 times its bulk of gas, and many vegetables much more. (Dr. Hales.) It is, therefore, not at all surprising that so much inconvenience should be felt from flatulency.

Treat. The treatment of flatulency consists mainly in the selection of proper articles of food. Oleraceous vegetables, peas, beans, and indigestible fruits, should be especially avoided, as well as the use of large quantities of washy liquids. The diet should consist principally of animal food, well cooked, with a sufficient quantity of good potatoes and wheaten bread, moderately seasoned with spices; and the most suitable beverages are toast and wa-

ter, and good brandy largely diluted with water. The healthy tone of the stomach may be re-established by the proper use of tonics, bitters, and mild aperients. (See DYSPEPSIA.)

To relieve the *fit of flatulency*, carminatives and aromatics, as peppermint, ginger, cinnamon, lavender, and the peppers, may be had recourse to. A glass of peppermint cordial, or brandy strongly flavored with essence of peppermint, or mixed with a spoonful of powdered ginger, is a popular and efficient remedy.

FLIES often cause considerable annoyance to the person in hot weather, and frequently do considerable damage to handsome furniture, especially picture-frames, gilding, &c., by alighting on them. The best way to remove them is to expose in a plate a mixture of 1 teaspoonful of black pepper, 2 teaspoonfuls of brown sugar, and 1 tablespoonful of cream; or a solution of sugar in a strong decoction of quassia, may be used instead. It is said that either of these mixtures will cause them rapidly to disappear.

Flies and other insects may be kept from attacking meat by dusting it over with pepper, powdered ginger, or any other spice, or by skewering a piece of paper to it on which a drop of creosote has been poured. The spices may be readily washed off with water before dressing the meat.

FLOUNDERS are a wholesome species of fish. They are both a sea and river fish; the latter are, however, preferred. They should be chosen by their *thickness* and *firmness*, and the *brightness of their eyes*. They are in season from January to March, and from July to September. They are nicest when dressed by frying in oil.

FLOUR. *Syn.* FLEUR DE FARINE, (*Fr.*) FARINA, (*Lat.*) The meal of bread corn. Of farinas the principal is wheat flour, or the ground seed of the Triticum hybernum vel vulgare, of which there are several varieties, chiefly depending on the amount of bran they contain, and the fineness of the sieves through which they are passed.

Fine wheat flour. (*Ador, Farina, F. tritici, F. seminis tritici.*) The finest flour obtained by sifting the meal produced in the first grinding of wheat between sharp stones, by a sieve of 64 wires to the inch; used for pastry.—*Middlings.* The remainder of the flour of the first grinding that will pass through a coarser sieve; used for making household bread, but is mostly reground.—*Seconds.* The finest part of the flour, obtained by grinding middlings over again, between blunt stones; used for making bakers' fine wheaten bread.—*Pollard.* The coarse flour, from whence the seconds has been sifted; used for making sea biscuits and gingerbread, and to fatten poultry and hogs.—*Country household flour.* Is usually ground only once, and sifted to four-fifths of the weight of the wheat. —*Ammunition flour.* Is required to be ground and sifted to $\frac{1260}{1515}$, or very nearly five-sixths the weight of the wheat. Thirty-two pecks of wheat in the London mills yield 38½ of flour, 8 of pollard, and 12 of bran, (*furfur tritici;*) the bulk of the wheat being doubled by grinding. (Accum.)

Pur. This article of food is very frequently adulterated both by the miller and the baker, as has been before alluded to in the article on BREAD. This fraud may, however, be readily detected by the following tests, which refer to *wheat flour.*

1. Wheat flour is distinguished by its cohesiveness, which is so great, that on being squeezed in the hand, the lump will be some time before it loses its shape.

2. *Plaster of Paris, ground bones, chalk, and potato flour*, when added to wheaten flour, may be detected by the specific gravity of the sample being considerably greater than that of pure flour. This may be readily ascertained by any person, by filling a small vessel with some pure flour, and then with the given sample. "A vessel which will contain 1 lb. of wheat flour will contain 1½ lbs. of fecula," (potato flour;) and hence "the proportion of this adulteration may be easily estimated." (Ure.)

3. Liquid ammonia (aqua ammoniæ puræ) turns wheat flour yellow; and if any other corn has been ground with it, pale brown; or if peas or beans have been ground with it, a darker brown.

4. Nitric acid turns wheat flour of an orange yellow color, but forms a stiff and tenacious jelly with potato fecula, the color of which it does not alter. (See ARROW-ROOT, BRITISH.)

5. Pure muriatic acid, when poured on potato flour, develops a smell of rushes; it also dissolves starch, but changes the color of wheat flour to a deep violet.

6. *Bean and pea flour* may be detected by pouring boiling water on the sample, or by making it into bread and toasting it, when the peculiar odor of those substances will be evolved.

7. The value of wheat flour as an aliment depends upon the quantity of gluten, sugar, starch, and phosphate of lime it contains; and its superiority over the flour of the grains of the other cereals, depends on its containing a larger proportion of the first and last of these substances. The qualitative analysis of flour is very simple, and may be easily made by persons unacquainted with chemistry. The following plan will be found to be a ready method of determining the proportion of the principal ingredients just named:—

a. Make 1000 grs. of flour into a dough with a little water, let it rest an hour, and then *gently* knead it in successive waters, until the starchy particles are perfectly removed. Collect the portion (gluten) left in the hand, drain off the water, place it on a piece of filtering or blotting paper, several times doubled, and set it aside.

b. Mix the several waters employed in the preceding process, and set them aside in a tall vessel, to deposite the suspended portion, (starch.) After a sufficient time, pour off the clear liquid, and throw the *whole* of the sediment on a *weighed* paper filter, placed in a funnel, observing to remove the portion adhering to the bottom of the vessel by means of a little clean water, that none may be lost.

c. Evaporate the decanted liquid, as well as what runs from the filter, until it becomes curdy, then filter through a piece of weighed blotting paper, and preserve the sediment, (albumen;) next evaporate to the consistence of a sirup, agitate with 10 times its weight of alcohol, and filter, observing to wash the paper clean with a little alcohol, after the solution has passed through it. The substance on the paper is phosphate of lime and gum,* and must be set aside.

* By digestion in water, filtration, and evaporation, the two may be obtained separately.

d. Evaporate or distil off the spirit from the solution and washings as above; the residuum is sugar.

e. Dry the substances educed by the preceding operations by a *gentle* heat, and weigh them. The weight of the albumen may be taken with that of the gluten, as it possesses about the same nutritive value, and also because it has been asserted by some persons that the former substance is in reality gluten, and not albumen. By dividing the given weights by 10, the per centage value of the sample will be obtained. The pieces of filtering paper employed should be dried and weighed before using them; and the same degree of heat should be employed for this purpose, as that to which they will be afterwards exposed in the drying of the substances resulting from the operation.

Remarks. This method of ascertaining the actual value of any sample of flour as an article of food, though not strictly accurate, approximates sufficiently to the truth for all practical purposes, and is well adapted to the wants of the baker and large purchaser. In many cases it will only be necessary to perform the first part of the process, *a*, which will give the amount of the most important constituent of the flour; the rest being of minor consequence.

According to Vauquelin, French wheat flour contains about 10% of water, 11% of gluten, 71% of starch, 5% of sugar, and 3% of gum; and the water of the dough amounts to 50·3%.

FLOUR, BAKED. *Syn.* Farina tosta. F. Tritici Tosta. Astringent; used to make food for infants troubled with diarrhœa.

FLOWERS. *Syn.* Flores, (*Lat.*) Fleurs, (*Fr.*) Blumen, (*Ger.*) These beautiful and fragrant ornaments of our gardens, our sitting-rooms, and our chambers, are too well known to require description; but some remarks on their preservation, &c., may not be out of place here.

Flowers may be preserved in a fresh state for a considerable time, by keeping them in a moist atmosphere. When growing on the parent stem, the large amount of evaporation from the surface of their leaves, is compensated for by an equivalent proportion of moisture supplied by the roots; but when they are plucked, the evaporation from the surface continues, while the supply of moisture is cut off. Hence they fade, and that with a degree of rapidity exactly proportionate to the dryness of the air that surrounds them. It is on this account that recently-plucked flowers fade more rapidly in-doors than in the open garden; for the air of a sitting-room is considerably *drier* and *warmer* than the external atmosphere. This is perfectly natural; for with diminished sources of nourishment, they are exposed to an augmented perspiration, and the water which forms the larger portion of their bodies is lost. In fact, they fade from the volatilization of one of their component parts, which is an essential constituent of every *living* flower. The flowers of plants also feed on the viewless oxygen of the air, and form carbonic acid with great rapidity. Thus those of the *passiflora serratifolia* consume of oxygen in this way 18½ times their bulk in 24 hours, when sheltered from the direct rays of the sun, at a temperature between 18° and 25° C.; the male flowers of the cucumber, 12 times their bulk; the female only 3½; the single red gilliflower (*cheiranthus incanus*) 11; the single tuberose 9; and the *typha latifolia* 9·8. (T. de Saussure, Ann. de Chim. xxi. 279.) To supply in part the loss of moisture by evaporation, has arisen the universal practice of placing them in water; but the mutilated stems possess a far inferior power of sucking up fluids to that of the roots, and though their decay may thus be slightly impeded, yet, as the balance of *gain* on the one hand by the roots, and *loss* on the other hand by evaporation from their whole surface, cannot be maintained, they fade as a natural consequence. To preserve them, or at least to render their existence less ephemeral, we have therefore only to restore this balance—to surround them with a medium that will rob them of no water; or, in other words, to place them in a moist atmosphere. "It is now eighteen years ago since we first saw, in the drawing-room of a gentleman, in the hot dry weather of the dog-days, flowers preserved day after day in all their freshness by the following simple contrivance:—A flat dish of porcelain had water poured into it. In the water a vase of flowers was set; over the whole a bell-glass was placed with its rim in the water. This was a 'Ward's case' in principle, although different in its construction. The air that surrounded the flowers being confined beneath the bell-glass, was constantly moist with the water that rose into it in the form of vapor. As fast as the water was condensed, it ran down the sides of the bell-glass back into the dish; and if means had been taken to enclose the water on the outside of the bell-glass, so as to prevent its evaporating into the air of the sitting-room, the atmosphere around the flowers would have remained continually damp. The only difference between plants in a 'Ward's case' and flowers in the little apparatus just described is this—that the former is intended for plants to grow in for a considerable space of time, while the latter is merely for their preservation for a few days; and that the air which surrounds the flowers is always charged with the same quantity of vapor, and will not vary with the circumstances, and at the will of him who has the management of it. We recommend those who love to see plenty of fresh flowers in their sitting-rooms in dry weather, to procure it. The experiment can be tried by inverting a tumbler over a rose-bud in a saucer of water." (Gardener's Chronicle.)

Faded flowers may be generally restored by immersing them half-way up their stems in very *hot* water, and allowing them to remain in it until it cools, or they have recovered. They must then be removed, the '*coddled*' portion of the stems cut off, and placed in clean cold water. In this way a great number of faded flowers may be restored, but there are some of the more fugacious kinds on which it proves useless.

To hasten the blowing of flowers the following liquid has been used with great advantage:—Sulphate or nitrate of ammonia 4 oz.; nitrate of potash 2 oz.; sugar 1 oz.; hot water 1 pint; dissolve and keep it in a well-corked bottle. *For use*, put 8 or 10 drops of this liquid into the water of a hyacinth-glass or jar for bulbous-rooted plants, changing the water every 10 or 12 days. For flowering plants in *pots* a few drops must be added to the water employed to moisten them. The preference

should be given to *rain* water for this purpose. A similar fluid, sold by Mr. Potter under the name of "liquid guano," is an excellent article to promote the growth and early flowering of plants.

Flowers may be produced in winter by taking up the plants, trees, or shrubs in the spring, at the time when they are about to bud, with some of their own soil carefully preserved among the roots, placing them upright in a cellar till Michaelmas; then, with the addition of fresh earth, they are to be put into proper tubs or vessels, and placed in a stove or hothouse, where they must every morning be moistened or refreshed with rain-water, to which a little of the solution above mentioned has been added. Thus in the month of February, fruits or roses will appear, and with respect to flowers in general, if they are sown in pots, at or before Michaelmas, and watered in a similar manner, they will blow at Christmas.

Flowers for medicinal purposes should be gathered as soon as unfolded, and dried as speedily as possible, at a gentle heat, the calices, claws, &c., being previously taken off; when the flowers are small the calix may be left on, or even the whole flowering spike dried without mutilation. *Labiate flowers* are usually dried in the latter state. *Blue flowers*, as those of violets, bugloss, &c., should be dipped for a moment into boiling water, before drying them, to prevent their becoming yellow or discolored. The color of the petals of red roses is best preserved by quick drying, after which the yellow anthers may be removed by sifting. The odor of roses and pinks is improved by this treatment. *Compound flowers*, with pappous seeds, ought to be gathered before they are entirely opened, and should be dried very high, to prevent the moisture developing the pappi, which by keeping would unfit them for medical use.

The best method of drying flowers is to spread them thinly on paper trays and place them in a stove-room, or a current of dry air, (preferably the latter,) or in the sun. For odorless flowers the temperature may be between 75° and 120° F., observing, however, not to employ sufficient heat to destroy their color. For fragrant and aromatic flowers the heat should not exceed 75°. The flowering tops of plants, as those of lavender, wormwood, melilot, &c., are usually tied in small parcels or bundles, loosely wrapped in paper, and then hung up, that they may not get discolored or broken. The succulent petals of some plants, whose odor is very fugacious, as some of the liliaceous kinds, cannot be well dried, as their fragrance is lost, and at the same time they rot and become discolored. (See VEGETABLES.)

FLOWERS, ARTIFICIAL. The beauty and value of these pleasing imitations of the vegetable kingdom mainly depend upon the taste and ingenuity of the maker. The delicate fingers of woman and her ready powers of imitation and invention, combined with her natural affection for the floral world, and her ready perception of the true and beautiful in nature and art, have enabled her especially to excel in this manufacture. At the present time, this art is carried to the greatest perfection by the female artificial florists of the French capital.

The French employ velvet, kid, and fine cambric for the petals, and taffeta for the leaves. Very recently thin plates of bleached whalebone have been used with great success for some portions of artificial flowers.

As *colors and stains*, the following are employed in Paris:—*Red*, carmine dissolved in a solution of salts of tartar, or in spirits of hartshorn; *yellow*, tincture of turmeric; *green*, a solution of distilled verdigris; *blue*, indigo dissolved in oil of vitriol, and the acid partly neutralized with salt of tartar or whiting; *violet*, liquid archil, mixed with a little salts of tartar; *lilac*, liquid archil. These colors are usually applied to the petals with the finger.

FLOWERS, (IN CHEMISTRY.) Pulverulent or flower-like substances obtained by sublimation, as flowers of benzoin, zinc, sulphur, &c. The term has been discarded from modern chemical nomenclature, but is still commonly employed in familiar language.

FLOWERS OF CALOMEL. Calomel resublimed from a retort, with a very short, wide neck, kept too hot for it to condense on, into a receiver half filled with water, and sufficiently hot to steam. A fine white powder, possessing the same properties as ordinary calomel.

FLOWERS OF ZINC. *Syn.* FLORES ZINCI. ZINCUM CALCINATUM. ZINCI OXIDUM. (P. L. before 1824.) Oxide of zinc obtained by the rapid combustion of metallic zinc in a deep crucible, placed sideways in a furnace, so that the flowers may be collected as they form. Antispasmodic. *Dose.* 5 to 10 grs. in epilepsy, &c. Also used as a white pigment, but dries badly.

FLUID, ETCHING. I. (For copper.) *Prep* *a.* Aquafortis 2 oz.; water 5 oz.; mix.

b. To the last add verdigris 1 oz., and water 3 oz.; dissolve.

c. Verdigris, common salt, and sal ammoniac, of each 4 oz.; alum 1 oz., (all in powder;) strong vinegar 8 oz.; water 1 lb.; dissolve by boiling for a moment, cool, and decant the clear. This is the *eau forte* of Callot and Piranesi.

II. (For steel.) *a.* Iodine 1 oz.; iron filings ½ dr.; water 4 oz.; mix and dissolve.

b. Pyroligneous acid 4 oz.; alcohol 1 oz.; mix and add nitric acid 1 oz.; all by measure. This menstruum was employed and recommended by Mr. Turrel. For the method of using the above fluids, see ETCHING.

FLUID MAGNESIA. *Prep.* Place recently precipitated carbonate of magnesia in a bottle or other suitable vessel, and fill it by means of a soda-water apparatus with water fully charged with carbonic acid gas. With slight and cautious agitation the aerated water will become saturated with magnesia. A scruple of carbonate of magnesia put into a bottle, and thus treated, will be all taken up in from 20 minutes to half an hour, and the beverage left beautifully clear. (Geo. Raistrick. Chem. v. 42.)

FLUMMERY, (IN COOKERY.) A species of thick hasty-pudding, made with oatmeal or rice, flavored with milk, cream, almonds, orange-flowers, lemons, &c., according to fancy. *French flummery* is made with equal parts of blanc-mange and cream, sweetened and flavored. *Dutch flummery* is blanc-mange and eggs, flavored with lemon and sweetened. All these are poured into forms and served cold, to eat with wine, spirits, cider, &c.

FLUOBORATES. *Syn.* FLUOBORIDES BOROFLUORIDES. HYDROFLUORBORATES. Compounds of fluoboric acid, with the salifiable bases. See the next article.

FLUOBORIC ACID. *Syn.* TERFLUORIDE OF BORON. A peculiar gaseous compound of fluorine and boron, discovered by Gay Lussac and Thénard.

Prep. Vitrified boracic acid 1 part; fluor spar 2 parts; mix, and expose the mixture to heat in a leaden retort. A colorless gas is evolved, which is rapidly absorbed by water, forming liquid fluoboric acid, (Gay Lussac, Thénard, Dr. Davy,) or boro-hydrofluoric acid, (Berzelius.) It does not attack glass, but rapidly destroys organic substances. Water absorbs 700 times its volume of this gas. (Davy.) See BOROFLUORIDE OF HYDROGEN.

FLUORIDES. Compounds of fluorine with the metals. (See FLUORINE.)

FLUORIDES OF CHROMIUM. I. (*Sesquifluoride.*) *Prep.* Dissolve hydrated oxide of chromium in hydrofluoric acid and evaporate. A crystalline green mass.

II. (*Perfluoride. Fluochromic Acid.*) Fluor spar 3 parts; chromate of lead 4 parts; fuming (or the strongest) sulphuric acid 5 parts; mix cautiously in a silver or leaden retort. A red colored gas is evolved, which acts rapidly on gas, forming fluosilicic acid gas, and upon water, forming hydrofluoric acid and chromic acid. The moisture of the atmosphere is sufficient to effect this decomposition, the former substance escaping under the form of gas, and the latter being deposited in small crystals. (See CHROMIC ACID.)

FLUORINE. The electro-negative elements of hydrofluoric acid and the fluorides. This substance, though long known in combination, has only been lately obtained in a separate state. The honor of having first obtained it in an insulated form is due to Baudrimont, who procured it by passing fluoride of boron over minium heated to redness, and receiving the gas in a dry vessel. As thus obtained, it is not absolutely pure, being contaminated with small quantities of hydrofluoric and silico-fluoric acids. It has a yellowish color, and an odor between that of chlorine and burnt sugar. In this state it does not act on glass, but combines directly with gold. With hydrogen it forms *hydrofluoric acid*, and with the metals *fluorides*. The word *fluorine* was given to this substance from its existing in fluor or Derbyshire spar. The adjectitious term fluor, (from *fluo*, I flow,) was applied to this spar or mineral from its ready fusibility, and being sometimes used as a flux to promote the fusion of certain refractory minerals.

FLUOSILICIC ACID. *Prep.* Powdered fluor spar and silicious sand, or powdered glass, 1 part; concentrated sulphuric acid 2 parts; mix in a glass retort, apply a gentle heat, and collect the evolved gas over mercury.

Remarks. A colorless incombustible gas, highly corrosive, and poisonous, but does not act on glass vessels, when they are quite dry. Water absorbs 365 times its volume of this gas, (Dr. Davy;) but decomposition ensues, *pure hydrated silicic acid* being deposited in a gelatinous state, and a solution of hydrofluoric acid, containing only two-thirds of the silicic acid originally present in the gas, being formed. (Berzelius.) This solution is called *silicated fluoric acid*, or *silico-hydrofluoric acid*. It is acid and corrosive. By the action of water of ammonia fluosilicic acid gas is completely decomposed, depositing its silica. In this way Dr. Davy obtained $\frac{614}{1000}$ of its weight of the latter substance.

FLUX. *Syn.* FLUSS, (*Ger.*) FLUX, (*Fr.*) FLUOR (*Lat.*, from *fluo*, I flow.) In PATHOLOGY, this term is occasionally applied to diarrhœa, cholera, and dysentery, but is nearly obsolete. In CHEMISTRY, fluxes are substances of easy fusibility, which are added to others more refractory, to promote their fusion. The principal fluxes are the following:—

1. (*Black flux.*) Cream of tartar 2 parts; nitre 1 part; powder, mix, and deflagrate, by small quantities at a time, in a red hot crucible. This is merely carbonate of potash, mixed with charcoal in a finely-divided state. It is used for smelting metallic ores, and exercises a reducing action, as well as promoting the fusion.

2. (*White flux. Cornish refining flux.*) Cream of tartar and nitre, equal parts; deflagrate as last.

3. (*Morveau's reducing flux.*) Powdered glass (containing no lead) 1 lb.; calcined borax 2 oz.; powdered charcoal 1 oz.; mix. Used for the same purposes as black flux.

4. (*Cornish reducing flux.*) Cream of tartar 10 oz.; nitre 4 oz.; borax 3 oz.; mix.

5. (*Crude flux.*) Nitre mixed with twice its weight of tartar, without deflagration. Reducing.

6. Borax, tartar, nitre, sal ammoniac, common salt, limestone, glass, fluor spar, and several other substances are used as fluxes in metallurgy.

Remarks. On the large scale crude tartar is employed.

FOILS. (From *feuille, Fr.*, or *folium, Lat.*, a leaf.) Thin leaves of polished metal, put under stones or pastes, to heighten the effect. Foils were formerly made of copper, tinned copper, tin, and silvered copper, but the latter is that wholly used for superior work at the present day. There are two descriptions of foils employed, viz., *white*, for diamonds and mock diamonds, and *colored*, for the colored gems. The latter are prepared by varnishing the former. By their judicious use the color of a stone may be often modified. Thus, by placing a yellow foil under a green stone that turns too much on the blue, or a red one turning too much on the crimson, the hues will be brightened.

Prep. I. (*White or common foil.*) This is made by coating a plate of copper with a layer of silver, and then rolling it into sheets in the flatting mill. The foil is then highly polished or varnished.

II. (*Colored foils.*) These are made by coloring the preceding foil, highly polished, with certain transparent solutions or varnishes. The following produce beautiful colored effects, when judiciously employed:—

a. (*Blue.*) Prussian blue, (preferably Turnbull's,) ground with pale, quick-drying oil. Used to deepen the color of sapphires. It may be diluted with oil.

b. (*Green.*) 1. Pale shellac, dissolved in alcohol, (lacker,) and tinged green by dissolving verdigris or acetate of copper in it. 2. "Sesquiferrocyanuret of iron" and bichromate of potassa, of each ½ oz.; grind them with a stone and muller to

a fine powder, add gum mastich (clean and also in fine powder) 2 oz.; grind again, add a little pyroxilic spirit, and again grind until the mass becomes homogeneous and of a fine transparent green; the beauty increases with the length of the grinding. The predominance of the bichromate turns it on the yellowish green; that of the salt of iron, on the bluish green. For use it is to be thinned with pyroxilic spirit." (Chemist, iii. 238.) This is used for emeralds. It may be brightened by adding a little yellow varnish.

c. (*Yellow.*) 1. Various shades of yellow may be produced by tinging a weak alcoholic solution of shellac or mastich, by digesting *turmeric, annatto, saffron,* or *socotrine aloes* therein. The former is the brightest and most fit for topazes. 2. Digest hay saffron in 5 or 6 times its weight of boiling water, until the latter becomes sufficiently colored, filter, and add a little solution of gum or isinglass. When dry, a coating of spirit varnish should be applied.

d. (*Red.*) Carmine dissolved in spirits of hartshorn, or a weak solution of salt of tartar, and gum added as above.

e. (*Garnet.*) Dragon's blood dissolved in rectified spirit of wine.

f. (*Vinegar garnet.*) Orange lake finely tempered with shellac varnish.

g. (*Amethyst.*) Lake and prussian blue, finely ground in pale drying oil.

h. (*Eagle marine.*) Verdigris tempered in shellac varnish, (alcoholic,) with a little prussian blue.

i. (*Ruby.*) 1. Lake or carmine, ground in isinglass. 2. Lake ground in shellac varnish. Used when the color turns on the purple. 3. Bright lake ground in oil; used when the color turns on the scarlet or orange.

k. (*Diamond.*) 1. Cover the inside of the socket in which the stone or paste is to be set with tin foil, by means of a little stiff gum or size; when dry, polish the surface, heat the socket, fill it with warm quicksilver, let it rest for two or three minutes, then pour it out and gently fit in the stone; lastly, well close the work round the stone, to prevent the alloy being shaken out. 2. Coat the bottom of the stone with a film of real silver, by precipitating it from a solution of the nitrate in spirits of ammonia, by means of the oils of cassia and cloves. (See SILVERING.) Both these methods vastly increase the brilliancy both of real and factitious gems.

Remarks. By the skilful use of the above varnishes, good imitations of the gems may be cheaply made from transparent white glass or paste, and when applied to foils set under colored pastes, (factitious gems,) a superior effect may be produced. The colors must be reduced to the finest state possible by *patient grinding*, as without this precaution, transparent and beautiful shades cannot be formed. The palest and cleanest mastich, and lac dissolved in alcohol, and also the palest and quickest drying oil should alone be employed, when these substances are ordered. In every case the colors must be laid on the foils with a broad soft brush, and the operation should be performed, if possible, at once, as no part should be *crossed*, or twice gone over while wet. If the color be not deep enough, a second coat may be given when the first one has become *quite* dry, but this practice is not to be recommended.

FOMENTATION. *Syn.* FOMENTUM, FOMENTATIO, FOTUS, (*Lat.*) FOMENTATION, (*Fr.*) I. Local bathing, with heated water, simple or medicated.

II. The liquid used for the above purpose. Fomentations are chiefly employed to allay pain and irritation, and to promote suppuration and the healthy action of the parts.

FOMENTATION. *Syn.* COMMON FOMENTATION. FOTUS COMMUNIS, (P. L. 1746.) Compound decoction of mallows.

FOMENTATION, ANODYNE. *Syn.* FOTUS ANODYNUS. *Prep.* (E. H.) Poppies 1 oz.; elder flowers ½ oz.; water 2½ pints; boil to 1½ pints. To relieve pain.

FOMENTATION, ANTISEPTIC. *Syn.* FOTUS ANTISEPTICUS. *Prep.* (Ger. H.) Decoction of bark lb. ij; infusion of chamomile lb. j; spirits of camphor f℥ij; muriatic acid fʒj; mix.

FOMENTATION, AROMATIC. *Syn.* FOTUS AROMATICUS. *Prep.* Sea wormwood, abrotanum and chamomiles, of each 1 oz.; laurel leaves ½ oz.; water 5 pints; boil to ½ gallon.

FOMENTATION, ASTRINGENT. *Syn.* FOTUS ASTRINGENS. F. ROBORANS. *Prep.* (P. H.) Bistort and pomegranate peel, of each 2 oz.; sal ammoniac ¼ oz.; red wine 1 pint; infuse at a gentle heat.

FOMENTATION FOR WORMS. *Syn.* FOTUS ANTHELMINTICUS. *Prep.* (P. Cod.) Leaves and flowers of tansy, wormwood, and chamomile, of each ℥iij; water lb. iij; boil to lb. ij.

FOMENTATION OF DIGITALIS. *Syn.* FOMENTUM DIGITALIS. *Prep.* (Guy's H.) Leaves of deadly nightshade, ℥j; boiling water lb. ij; infuse.

FOMENTATION OF HEMLOCK. *Syn.* FOMENTUM CICUTÆ. F. CONII. *Prep.* (St. B. H.) Fresh hemlock leaves, ℥ij; (or dried leaves, ℥j;) water 1½ pints; boil to a pint.

FOMENTATION OF ELDER FLOWERS. *Syn.* FOTUS SAMBUCI. *Prep.* (P. Cod.) Elder flowers ʒiij; boiling water 1 quart; macerate 1 hour.

FOMENTATION OF SAL AMMONIAC. *Syn.* FOMENTUM AMMONIÆ MURIATIS. *Prep.* (P. C.) Compound decoction of mallows ℥xxxij; sal ammoniac ℥j; dissolve, and add spirit of camphor ℥ij.

FOMENTATION, RESOLVENT. *Syn.* FOTUS RESOLVENS. *Prep.* (Richard.) Fomentation of elder flowers ℥viij; liquor of diacetate of lead ʒss; mix.

FOMENTATION, VINOUS. *Syn.* FOTUS VINOSUS. *Prep.* (P. Cod.) Red wine 1 quart; honey ℥ivss; dissolve.

FORCEMEAT. *Syn.* FARCE. (In COOKERY.) A species of sausage meat, either served up alone, or employed as an ingredient in other dishes Our notice of this article must be confined to the following extracts from a popular System of Cookery:—

"According to what it is wanted for should be the selection from the following list, observing that of the most pungent articles, least must be used No one flavor should predominate greatly; yet if several dishes be served the same day, there should

be a marked variety in the tastes of the forcemeats, as well as of the gravies. A general fault is, that the tastes of lemon-peel and thyme overcome all others; therefore they should only be used in small quantities. They should be consistent enough to cut with a knife, but not dry and heavy. Herbs are a very essential ingredient; and it is the copious and judicious use of them that chiefly gives the cookery of the French its superior flavor. To *force* fowls, meat, &c., is to stuff them." (Mrs. Rundel.)

"*Forcemeat ingredients.* Cold fowl, veal, or mutton; scraped ham or gammon; fat bacon, or the fat of ham; beef-suet; veal-suet; butter; marrow; crumbs of bread; parsley; white pepper; salt; nutmeg; yelk and white of eggs, well beaten to bind the mixture.

"Cold sole; oysters; anchovy; lobsters; tarragon; savory; pennyroyal; knotted marjoram; thyme and lemon-thyme; basil; sage; lemon-peel; yelks of hard eggs; mace and cloves; cayenne; garlic; shalot; onion; chives; chervil; Jamaica pepper in fine powder, or two or three cloves."

The first paragraph contains the articles of which the forcemeat may be made, without any striking flavor; and to these may be added some of the different ingredients in the second paragraph, to vary the taste.

I. (*For fowls or meat.*) Shred a little ham or gammon, some cold veal or fowl, some beef-suet, a small quantity of onion, some parsley, very little lemon-peel, salt, nutmeg, or pounded mace, and either white pepper or cayenne, and bread-crumbs: pound it in a mortar, and bind it with one or two eggs, beaten or strained. For forcemeat patties, the mixture as above.

II. (*For hare, or any thing in imitation of it.*) The scalded liver, an anchovy, some fat bacon, a little suet, some parsley, thyme, knotted marjoram, a little shalot, and either onion or chives, all chopped fine; crumbs of bread, pepper, and nutmeg, beat in a mortar with an egg.

III. (*For fish soups, or fish stewed on maigre days.*) Beat the flesh and soft parts of a middling lobster, half an anchovy, a large piece of boiled celery, the yelk of a hard egg, a little cayenne, mace, salt, and white pepper, with two table-spoonfuls of bread-crumbs, one ditto of oyster liquor, two ounces of butter, warmed, and two eggs long beaten: make into balls, and fry of a fine brown in butter.

IV. (*For fish.*) Chop, and afterwards pound in a mortar, any kind of fish, adding an anchovy or two, or a teaspoonful of the essence of anchovies, (but do not allow the taste to prevail,) and the yelk of a hard-boiled egg: if for the maigre, pound butter with it; but otherwise, the fat of bacon pounded separately, and then mixed: add a third portion of bread, prepared by previously pounding and soaking, and mix the whole up with raw eggs.

V. (*Common veal-stuffing.*) Take equal quantities of beef-suet and crumbs of bread, chop the suet very finely: chop together a bundle of sweet herbs; add to them a tea or salt spoonful of grated lemon-peel, and pepper and salt. Ude, who is good authority, observes that "it would not be amiss to add a piece of butter, and pound the whole in a mortar;" mix it up with eggs.

Obs. Grated ham or tongue may be added to this stuffing.

By mixing with any potted meat or game an equal proportion of soaked bread, (which will always be lighter than bread-crumbs,) the cook will have at once a very fine species of farce, to be employed in stuffing olives, fillets of fowl, &c. Bacon or butter must always be substituted for suet when the forcemeat is to be eaten cold.

At many tables, where every thing else is well done, it is common to find very bad stuffing.

FORMIC ACID. (From *Formica*, an ant.) The sour liquid ejected by ants when irritated. It was formerly solely obtained from these insects by distilling them along with water. This acid was discovered by Gehlen, but first prepared artificially by Doebereiner.

Prep. I. (Doebereiner.) Tartaric acid 2 parts; peroxide of manganese and concentrated sulphuric acid, of each 3 parts; water 5 parts; distil in a capacious retort into a well-cooled receiver.

II. (Ure.) Tartaric acid 10 parts; concentrated sulphuric acid 15 parts; black oxide of manganese 14 parts; water 20 to 30 parts; distil as last.

III. (Mr. C. Watt, jun.) Coal naphtha (or pyroxilic spirit) 1 part; bichromate of potassa and sulphuric acid, of each 3 parts; place the naphtha in a flask fitted with a funnel tube; the bichromate of potassa is then to be added, and the sulphuric acid, diluted with an equal weight of water, gradually poured down the funnel; while the acid is being added, heat is to be applied, when the formic acid will distil over, and may be condensed in a vessel kept cool. A portion of naphtha will distil over with the formic acid, which may be again treated with bichromate of potassa and sulphuric acid, when a fresh portion of formic acid will be produced. If this acid be required perfectly pure, it must be saturated with pure carbonate of soda or potassa, and subjected to a gentle heat to volatilize any small portion of naphtha with which it may be contaminated. The formic acid is then to be liberated from the salt by means of dilute sulphuric acid, and subjected to distillation, when the acid will be obtained perfectly pure. This process yields a large product. (Chemist, iii. 233.)

IV. (Liebig.) *a.* Starch 1 part; peroxide of manganese, in fine powder, 4 parts; water 4 parts; mix in an alembic, or retort; heat to 104° F.; then add 4 parts of oil of vitriol, by degrees, and after the frothing is over, apply heat and distil off $4\frac{1}{2}$ parts of liquid. The retort should have a capacity equal to 10 times the bulk of the ingredients.

b. (*On the small scale.*) Starch 10 parts; peroxide of manganese 37 parts; oil of vitriol and water, of each, 30 parts; as last. *Product.* 3·35 parts of an acid capable of neutralizing 15§ of dry carbonate of soda.

c. (*Pure hydrated formic acid.*) 1. Introduce formiate of lead, in fine powder, into a long glass tube, connect one end with an apparatus evolving sulphureted hydrogen, and the other with a receiver. When the salt is entirely decomposed (blackened) apply *a very gentle* heat, and collect the distilled liquid; lastly, boil the product for a minute or less, to expel any adhering sulphureted gas. This hydrate contains 1 atom or 20§ of water. 2. Dry formiate of lead, 18 parts; oil of vitriol 6 parts; water 1 part; distil in a muriate of

lime bath. This hydrate contains 2 atoms of water.

d. Formiate of lime 10 parts; oil of vitriol 8 parts; water 4 parts; distil. *Product.* Nine parts of pure but dilute acid; sp. gr. 1·075.

Remarks. The processes *c.* 1 and 2, yield perfectly pure hydrated formic acid, the others, mere solutions of this acid in water. They are all limpid and colorless. The first hydrate (IV, *c*,) boils at 212°, crystallizes in brilliant scales below 32°, and has the sp. gr. 1·2353. The second hydrate (IV, *c*, 2,) boils at 223°, does not solidify at —5°, and has the sp. gr. 1·11. Both the above are extremely corrosive, and rapidly destroy the texture of living organic substances. The products of the other processes are very dilute.

Formic acid reduces the salts of mercury and silver, and forms salts with the bases termed *formiates.* Most of these may be formed by either saturating the acid with the hydrate, carbonate, or oxide of the base, or by double decomposition, by adding a solution of a soluble salt of the base to another of an alkaline formiate. They are all soluble in water.

FORMIC ETHER. *Syn.* FORMIATE OF OXIDE OF ETHULE. *Prep.* Dry formiate of soda 7 parts; oil of vitriol 10 parts; alcohol of 90§, 6 parts; mix in a retort connected with a well-cooled receiver. The greater part will distil over by the heat spontaneously developed. Purify by agitation, first with milk of lime, and afterwards with chloride of calcium. It is limpid, smells aromatic, is lighter than water, soluble in 10 parts of that fluid, and boils at 128° F. (See ETHER, AND ETHERS, ORGANIC.)

FORMO-BENZOIC ACID. *Syn.* FORMIATE OF HYDRURET OF BENZULE. A peculiar acid discovered by Winkler, and obtained by dissolving oil of bitter almonds in water, adding muriatic acid, evaporating, and treating the dry mass with ether, which dissolves out the new acid: it may be decolored by animal charcoal, and obtained in crystals by evaporation. It readily combines with the bases, forming salts called *formobenzoates.*

FORMOMETHYLAL. *Syn.* FORMIATE OF METHULE, (*tribasic.*) A very volatile liquid, obtained by Kane, by distilling a mixture of 2 parts each of pyroxilic spirit and peroxide of manganese, and 3 parts each of oil of vitriol and water. Several products first distil over, and after the boiling point of the distilled liquor reaches 177°, the formiate of methule begins to collect in the receiver.

FORMULE. A hypothetical organic radical, supposed to consist of 2 eq. of carbon and 1 eq. of hydrogen, of which formic acid is the oxide. Its existence is inferred from the constitution of certain known compounds. (Liebig.) Iodide, bromide, chloride, and sulphuret of formule, have been obtained, but are only interesting in a scientific point of view.

FOXING. The spontaneous souring of worts or beer during fermentation or ripening. It is generally occasioned by want of proper attention or skill on the part of the brewer. (See BREWING.)

FRAXININE. A peculiar, soluble, bitter, neutral, and crystallizable substance, extracted from the bark of fraxinus excelsior.

FRECKLES may be removed by the frequent application of *dilute* spirits, acids, or alkaline solutions; the latter two just strong enough to prick the tongue. (See COSMETICS.)

FREEMAN'S BATHING SPIRITS. Opodeldoc, colored with Daffy's elixir.

FREEZING. *Syn.* CONGELATION, (*Fr.*) CONGELATIO, (*Lat.*) GEFRIERUNG, (*Ger.*). The conversion of a liquid into the solid state, by the abstraction of a portion of its caloric. (See CONGELATION.)

FRENCH BERRIES. *Syn.* PERSIAN BERRIES. AVIGNON DO. GRAINES D'AVIGNON. The berries or fruit of the rhamnus infectorius. They are imported from France and Persia; those from the latter country being esteemed the best. Their decoction dyes cloth, mordanted with alum, tartar, or protomuriate of tin, of a yellow color; with sulphate of copper, an olive, and with red sulphate of iron, an olive-green color.

FRENCH POLISH. *Prep.* I. A solution of shellac in wood naphtha, (pyroxilic spirit.)

II. Pale shellac 3 lbs.; mastich 6 oz.; alcohol of 90§, 3 quarts.

III. Shellac 2 lbs.; mastich and sandaric, (both in powder,) of each 1 oz.; copal varnish 12 oz.; alcohol 1 gallon.

Remarks. All the above are made in the cold by frequently stirring or shaking the ingredients together in a well-closed bottle or other vessel. French polish is used without filtering. (See the next article.)

FRENCH POLISH, (TO.) The varnish being prepared, (shellac,) the article to be polished being finished off as smoothly as possible with glass paper, and your rubber being made as directed below, proceed to the operation as follows:—The varnish, in a narrow-necked bottle, is to be applied to the *middle* of the flat face of the rubber, by laying the rubber on the mouth of the bottle and shaking up the varnish once, as by this means the rubber will imbibe the proper quantity to varnish a considerable extent of surface. The rubber is then to be enclosed in a soft linen cloth, doubled, the rest of the cloth being gathered up at the back of the rubber to form a handle. Moisten the face of the linen with a little *raw* linseed oil, applied with the finger to the middle of it. Place your work opposite the light, pass your rubber *quickly* and *lightly* over its surface until the varnish becomes dry, or nearly so; again charge your rubber as before with varnish, (omitting the oil,) and repeat the rubbing, until three coats are laid on, when a little oil may be applied to the rubber, and two coats more given to it. Proceed in this way until the varnish has acquired some thickness; then wet the *inside* of the linen cloth, before applying the varnish, with alcohol, or wood naphtha, and rub quickly, lightly, and uniformly the whole surface. Lastly, wet the linen cloth with a little oil and alcohol without varnish, and rub as before till dry.

To make the rubber, roll up a strip of *thick* woollen cloth which has been torn off, so as to form a soft elastic edge. It should form a coil, from 1 to 3 inches in diameter, according to the size of the work

FRICTION. (From *frico*, I rub.) In MECHANICS, the resistance produced by the rubbing together of the surfaces of solid bodies. The amount of friction is proportionate to the rough-

VI. Fish may be preserved in a living state for 14 days or longer without water, by stopping their mouths with crumb of bread steeped in brandy, pouring a little brandy into them, and then placing them in straw in a moderately cool situation. (Prechtl. Encycl. Techn.)

VII. Immersion of the *cleaned* fish in water holding in solution $\frac{1}{300}$ or $\frac{1}{400}$ part of creosote, and then drying them.

VII. Fish may be preserved in a dry state, and perfectly fresh, by means of sugar alone. Fresh fish may be thus kept for some days, so as to be as good when boiled as if just caught. If dried and kept free from mouldiness, there seems no limit to their preservation; and they are much better in this way than when salted. The sugar gives no disagreeable taste. This process is particularly valuable in making what is called *kippered salmon;* and the fish preserved in this manner are far superior in quality and flavor to those which are salted or smoked. A few tablespoonfuls of brown sugar are sufficient for a salmon of five or six pounds weight; and if salt be desired, a teaspoonful may be added. Saltpetre may be used instead, in the same proportion, if it be wished to make the kipper hard. (See ANIMAL SUBSTANCES USED AS FOOD.)

FIXATEUR. *Syn.* BANDOLINE. *Prep.* Soak Iceland moss in cold water for an hour or two, drain and dissolve in boiling water.

Remarks. A solution of gum arabic in water is also commonly called by the same name. It is used by ladies to make their hair curl firmly, and remain in any required position. It is applied by moistening the fingers, and passing the hair through them. Beer has a similar effect.

FLANNEL. It has been shown by the experiments of Count Rumford that the conducting power of the different materials employed for clothing varies considerably. A thermometer, surrounded with cotton-wool, and heated by immersion in boiling water, took 1046 seconds to lose 135°, when plunged into a bath of melting ice; but, under the same circumstances, when sheeps' wool was employed, 1118 seconds elapsed before a like sinking of the thermometer took place, (Phil. Trans. 1792;) thus showing the greater conducting power of the former, and consequently the superiority of the latter substance for the manufacture of warm clothing. But the chief advantage of wool as an article for under-clothing depends less upon its actual power of conducting heat than its peculiar texture. Flannel acts as a gentle stimulus on the skin, and exercises the most beneficial action, by keeping the pores clean, and in a state most favorable to perspiration. It has also the advantage of absorbing the perspiration as soon as emitted, and allowing its watery portion to pass off into the atmosphere almost as soon as formed, but this is not the case with cotton and linen fabrics. The different effects of flannel and linen are particularly perceptible during brisk exercise. When the body is covered with the former, though perspiration be necessarily increased, the perspired matter freely passes off through the flannel, and the skin remains dry and warm. If the same exercise be taken in linen shirts, perspiration, as in the former case, is indeed also increased, but the perspired matter, instead of being dispersed into the atmosphere, remains upon the linen, and not only clogs the pores of the skin, but gives a disagreeable sensation. From this property of flannel, persons who wear it next the skin seldom catch cold from changes of temperature, even though perspiring profusely; but in similar cases, when linen or calico shirts are worn, chilliness immediately comes on, followed by "*sniffling, sneezing*, and *cough*," and all the other symptoms of severe catarrh.

The common objections raised against the use of flannel are founded on vulgar prejudices, arising from ignorance, obstinacy, or bravado, and are undeserving of the notice of sensible people. In a fickle and moist climate like that of England, every person should wear a robe of flannel next the skin, or at all events a waistcoat of flannel reaching below the loins; and this should not be discarded as soon as the cold weather has passed, but its use should be continued all the year round; for in reality, flannel is, if possible, even more required in summer than in winter, because persons perspire more freely in hot than in cold weather, and are consequently more susceptible of cold, while at that period of the year their clothing is less capable of protecting them from the effects of sudden changes of temperature, and draughts of cold air, moisture, &c. Females, children, persons of delicate constitutions, and all others, who, from their habits of body or life, perspire freely, or are much exposed, should wear flannel.

In washing flannels, it is said they should be always put into scalding hot water, by which method their color will be preserved, and they will be prevented from shrinking.

FLASH. *Prep.* Burnt-sugar coloring 1 gall.; fluid extract of capsicum, or essence of cayenne, ½ pint, or enough to give a strong fiery taste.

Use. It is employed to color spirits, and to give them a false strength. It is made by the brewers' druggists, and vended under the name of "*isinglass and burnt sugar.*"

FLATULENCY. (From *flatus*, a blast.) A morbid collection of gas in the stomach and bowels. The most common cause of flatulency is indigestion. When the natural fluids of the stomach are secreted in a healthy state, they exercise an antiseptic and digestive action on the food, by which it is speedily reduced to a magma that is little liable to spontaneous change while in the body; but when the reverse is the case, fermentation rapidly commences, and the stomach and associated viscera become distended with gas, giving rise to frequent eructation and crepitation. The quantity of gas thus accumulated is often enormous. It is asserted that an ordinary apple during fermentation yields about 600 times its bulk of gas, and many vegetables much more. (Dr. Hales.) It is, therefore, not at all surprising that so much inconvenience should be felt from flatulency.

Treat. The treatment of flatulency consists mainly in the selection of proper articles of food. Oleraceous vegetables, peas, beans, and indigestible fruits, should be especially avoided, as well as the use of large quantities of washy liquids. The diet should consist principally of animal food, well cooked, with a sufficient quantity of good potatoes and wheaten bread, moderately seasoned with spices; and the most suitable beverages are toast and wa-

ter, and good brandy largely diluted with water. The healthy tone of the stomach may be re-established by the proper use of tonics, bitters, and mild aperients. (See DYSPEPSIA.)

To relieve the *fit of flatulency*, carminatives and aromatics, as peppermint, ginger, cinnamon, lavender, and the peppers, may be had recourse to. A glass of peppermint cordial, or brandy strongly flavored with essence of peppermint, or mixed with a spoonful of powdered ginger, is a popular and efficient remedy.

FLIES often cause considerable annoyance to the person in hot weather, and frequently do considerable damage to handsome furniture, especially picture-frames, gilding, &c., by alighting on them. The best way to remove them is to expose in a plate a mixture of 1 teaspoonful of black pepper, 2 teaspoonfuls of brown sugar, and 1 tablespoonful of cream; or a solution of sugar in a strong decoction of quassia, may be used instead. It is said that either of these mixtures will cause them rapidly to disappear.

Flies and other insects may be kept from attacking meat by dusting it over with pepper, powdered ginger, or any other spice, or by skewering a piece of paper to it on which a drop of creosote has been poured. The spices may be readily washed off with water before dressing the meat.

FLOUNDERS are a wholesome species of fish. They are both a sea and river fish; the latter are, however, preferred. They should be chosen by their *thickness* and *firmness*, and the *brightness of their eyes*. They are in season from January to March, and from July to September. They are nicest when dressed by frying in oil.

FLOUR. *Syn.* FLEUR DE FARINE, (*Fr.*) FARINA, (*Lat.*) The meal of bread corn. Of farinas the principal is wheat flour, or the ground seed of the Triticum hybernum vel vulgare, of which there are several varieties, chiefly depending on the amount of bran they contain, and the fineness of the sieves through which they are passed.

Fine wheat flour. (*Ador, Farina, F. tritici, F. seminis tritici.*) The finest flour obtained by sifting the meal produced in the first grinding of wheat between sharp stones, by a sieve of 64 wires to the inch; used for pastry.—*Middlings.* The remainder of the flour of the first grinding that will pass through a coarser sieve; used for making household bread, but is mostly reground.—*Seconds.* The finest part of the flour, obtained by grinding middlings over again, between blunt stones; used for making bakers' fine wheaten bread.—*Pollard.* The coarse flour, from whence the seconds has been sifted; used for making sea biscuits and gingerbread, and to fatten poultry and hogs.—*Country household flour.* Is usually ground only once, and sifted to four-fifths of the weight of the wheat. —*Ammunition flour.* Is required to be ground and sifted to $\frac{1260}{2256}$, or very nearly five-sixths the weight of the wheat. Thirty-two pecks of wheat in the London mills yield 38½ of flour, 8 of pollard, and 12 of bran, (*furfur tritici;*) the bulk of the wheat being doubled by grinding. (Accum.)

Pur. This article of food is very frequently adulterated both by the miller and the baker, as has been before alluded to in the article on BREAD. This fraud may, however, be readily detected by the following tests, which refer to *wheat flour.*

1. Wheat flour is distinguished by its cohesiveness, which is so great, that on being squeezed in the hand, the lump will be some time before it loses its shape.

2. *Plaster of Paris, ground bones, chalk, and potato flour*, when added to wheaten flour, may be detected by the specific gravity of the sample being considerably greater than that of pure flour. This may be readily ascertained by any person, by filling a small vessel with some pure flour, and then with the given sample. "A vessel which will contain 1 lb. of wheat flour will contain 1½ lbs. of fecula," (potato flour;) and hence "the proportion of this adulteration may be easily estimated." (Ure.)

3. Liquid ammonia (aqua ammoniæ puræ) turns wheat flour yellow; and if any other corn has been ground with it, pale brown; or if peas or beans have been ground with it, a darker brown.

4. Nitric acid turns wheat flour of an orange yellow color, but forms a stiff and tenacious jelly with potato fecula, the color of which it does not alter. (See ARROW-ROOT, BRITISH.)

5. Pure muriatic acid, when poured on potato flour, develops a smell of rushes; it also dissolves starch, but changes the color of wheat flour to a deep violet.

6. *Bean and pea flour* may be detected by pouring boiling water on the sample, or by making it into bread and toasting it, when the peculiar odor of those substances will be evolved.

7. The value of wheat flour as an aliment depends upon the quantity of gluten, sugar, starch, and phosphate of lime it contains; and its superiority over the flour of the grains of the other cereals, depends on its containing a larger proportion of the first and last of these substances. The qualitative analysis of flour is very simple, and may be easily made by persons unacquainted with chemistry. The following plan will be found to be a ready method of determining the proportion of the principal ingredients just named:—

a. Make 1000 grs. of flour into a dough with a little water, let it rest an hour, and then *gently* knead it in successive waters, until the starchy particles are perfectly removed. Collect the portion (gluten) left in the hand, drain off the water, place it on a piece of filtering or blotting paper, several times doubled, and set it aside.

b. Mix the several waters employed in the preceding process, and set them aside in a tall vessel, to deposite the suspended portion, (starch.) After a sufficient time, pour off the clear liquid, and throw the *whole* of the sediment on a *weighed* paper filter, placed in a funnel, observing to remove the portion adhering to the bottom of the vessel by means of a little clean water, that none may be lost.

c. Evaporate the decanted liquid, as well as what runs from the filter, until it becomes curdy, then filter through a piece of weighed blotting paper, and preserve the sediment, (albumen;) next evaporate to the consistence of a sirup, agitate with 10 times its weight of alcohol, and filter, observing to wash the paper clean with a little alcohol, after the solution has passed through it. The substance on the paper is phosphate of lime and gum,* and must be set aside.

* By digestion in water, filtration, and evaporation, the two may be obtained separately.

d. Evaporate or distil off the spirit from the solution and washings as above; the residuum is sugar.

e. Dry the substances educed by the preceding operations by a *gentle* heat, and weigh them. The weight of the albumen may be taken with that of the gluten, as it possesses about the same nutritive value, and also because it has been asserted by some persons that the former substance is in reality gluten, and not albumen. By dividing the given weights by 10, the per centage value of the sample will be obtained. The pieces of filtering paper employed should be dried and weighed before using them; and the same degree of heat should be employed for this purpose, as that to which they will be afterwards exposed in the drying of the substances resulting from the operation.

Remarks. This method of ascertaining the actual value of any sample of flour as an article of food, though not strictly accurate, approximates sufficiently to the truth for all practical purposes, and is well adapted to the wants of the baker and large purchaser. In many cases it will only be necessary to perform the first part of the process, *a*, which will give the amount of the most important constituent of the flour; the rest being of minor consequence.

According to Vauquelin, French wheat flour contains about 10§ of water, 11§ of gluten, 71§ of starch, 5§ of sugar, and 3§ of gum; and the water of the dough amounts to 50·3§.

FLOUR, BAKED. *Syn.* Farina tosta. F. Tritici Tosta. Astringent; used to make food for infants troubled with diarrhœa.

FLOWERS. *Syn.* Flores, (*Lat.*) Fleurs, (*Fr.*) Blumen, (*Ger.*) These beautiful and fragrant ornaments of our gardens, our sitting-rooms, and our chambers, are too well known to require description; but some remarks on their preservation, &c., may not be out of place here.

Flowers may be preserved in a fresh state for a considerable time, by keeping them in a moist atmosphere. When growing on the parent stem, the large amount of evaporation from the surface of their leaves, is compensated for by an equivalent proportion of moisture supplied by the roots; but when they are plucked, the evaporation from the surface continues, while the supply of moisture is cut off. Hence they fade, and that with a degree of rapidity exactly proportionate to the dryness of the air that surrounds them. It is on this account that recently-plucked flowers fade more rapidly indoors than in the open garden; for the air of a sitting-room is considerably *drier* and *warmer* than the external atmosphere. This is perfectly natural; for with diminished sources of nourishment, they are exposed to an augmented perspiration, and the water which forms the larger portion of their bodies is lost. In fact, they fade from the volatilization of one of their component parts, which is an essential constituent of every *living* flower. The flowers of plants also feed on the viewless oxygen of the air, and form carbonic acid with great rapidity. Thus those of the *passiflora serratifolia* consume of oxygen in this way 18½ times their bulk in 24 hours, when sheltered from the direct rays of the sun, at a temperature between 18° and 25° C.; the male flowers of the cucumber, 12 times their bulk; the female only 3¼; the single red gilliflower (*cheiranthus incanus*) 11; the single tuberose 9; and the *typha latifolia* 9·8. (T. de Saussure, Ann. de Chim. xxi. 279.) To supply in part the loss of moisture by evaporation, has arisen the universal practice of placing them in water; but the mutilated stems possess a far inferior power of sucking up fluids to that of the roots, and though their decay may thus be slightly impeded, yet, as the balance of *gain* on the one hand by the roots, and *loss* on the other hand by evaporation from their whole surface, cannot be maintained, they fade as a natural consequence. To preserve them, or at least to render their existence less ephemeral, we have therefore only to restore this balance—to surround them with a medium that will rob them of no water; or, in other words, to place them in a moist atmosphere. "It is now eighteen years ago since we first saw, in the drawing-room of a gentleman, in the hot dry weather of the dog-days, flowers preserved day after day in all their freshness by the following simple contrivance:—A flat dish of porcelain had water poured into it. In the water a vase of flowers was set; over the whole a bell-glass was placed with its rim in the water. This was a 'Ward's case' in principle, although different in its construction. The air that surrounded the flowers being confined beneath the bell-glass, was constantly moist with the water that rose into it in the form of vapor. As fast as the water was condensed, it ran down the sides of the bell-glass back into the dish; and if means had been taken to enclose the water on the outside of the bell-glass, so as to prevent its evaporating into the air of the sitting-room, the atmosphere around the flowers would have remained continually damp. The only difference between plants in a 'Ward's case' and flowers in the little apparatus just described is this—that the former is intended for plants to grow in for a considerable space of time, while the latter is merely for their preservation for a few days; and that the air which surrounds the flowers is always charged with the same quantity of vapor, and will not vary with the circumstances, and at the will of him who has the management of it. We recommend those who love to see plenty of fresh flowers in their sitting-rooms in dry weather, to procure it. The experiment can be tried by inverting a tumbler over a rose-bud in a saucer of water." (Gardener's Chronicle.)

Faded flowers may be generally restored by immersing them half-way up their stems in very *hot* water, and allowing them to remain in it until it cools, or they have recovered. They must then be removed, the '*coddled*' portion of the stems cut off, and placed in clean cold water. In this way a great number of faded flowers may be restored, but there are some of the more fugacious kinds on which it proves useless.

To hasten the blowing of flowers the following liquid has been used with great advantage:—Sulphate or nitrate of ammonia 4 oz.; nitrate of potash 2 oz.; sugar 1 oz.; hot water 1 pint; dissolve and keep it in a well-corked bottle. *For use*, put 8 or 10 drops of this liquid into the water of a hyacinth-glass or jar for bulbous-rooted plants, changing the water every 10 or 12 days. For flowering plants in *pots* a few drops must be added to the water employed to moisten them. The preference

should be given to *rain* water for this purpose. A similar fluid, sold by Mr. Potter under the name of "liquid guano," is an excellent article to promote the growth and early flowering of plants.

Flowers may be produced in winter by taking up the plants, trees, or shrubs in the spring, at the time when they are about to bud, with some of their own soil carefully preserved among the roots, placing them upright in a cellar till Michaelmas; then, with the addition of fresh earth, they are to be put into proper tubs or vessels, and placed in a stove or hothouse, where they must every morning be moistened or refreshed with rain-water, to which a little of the solution above mentioned has been added. Thus in the month of February, fruits or roses will appear, and with respect to flowers in general, if they are sown in pots, at or before Michaelmas, and watered in a similar manner, they will blow at Christmas.

Flowers for medicinal purposes should be gathered as soon as unfolded, and dried as speedily as possible, at a gentle heat, the calices, claws, &c., being previously taken off; when the flowers are small the calix may be left on, or even the whole flowering spike dried without mutilation. *Labiate flowers* are usually dried in the latter state. *Blue flowers*, as those of violets, bugloss, &c., should be dipped for a moment into boiling water, before drying them, to prevent their becoming yellow or discolored. The color of the petals of red roses is best preserved by quick drying, after which the yellow anthers may be removed by sifting. The odor of roses and pinks is improved by this treatment. *Compound flowers*, with pappous seeds, ought to be gathered before they are entirely opened, and should be dried very high, to prevent the moisture developing the pappi, which by keeping would unfit them for medical use.

The best method of drying flowers is to spread them thinly on paper trays and place them in a store-room, or a current of dry air, (preferably the latter,) or in the sun. For odorless flowers the temperature may be between 75° and 120° F., observing, however, not to employ sufficient heat to destroy their color. For fragrant and aromatic flowers the heat should not exceed 75°. The flowering tops of plants, as those of lavender, wormwood, melilot, &c., are usually tied in small parcels or bundles, loosely wrapped in paper, and then hung up, that they may not get discolored or broken. The succulent petals of some plants, whose odor is very fugacious, as some of the liliaceous kinds, cannot be well dried, as their fragrance is lost, and at the same time they rot and become discolored. (See VEGETABLES.)

FLOWERS, ARTIFICIAL. The beauty and value of these pleasing imitations of the vegetable kingdom mainly depend upon the taste and ingenuity of the maker. The delicate fingers of woman and her ready powers of imitation and invention, combined with her natural affection for the floral world, and her ready perception of the true and beautiful in nature and art, have enabled her especially to excel in this manufacture. At the present time, this art is carried to the greatest perfection by the female artificial florists of the French capital.

The French employ velvet, kid, and fine cambric for the petals, and taffeta for the leaves. Very recently thin plates of bleached whalebone have been used with great success for some portions of artificial flowers.

As *colors and stains*, the following are employed in Paris:—*Red*, carmine dissolved in a solution of salts of tartar, or in spirits of hartshorn; *yellow*, tincture of turmeric; *green*, a solution of distilled verdigris; *blue*, indigo dissolved in oil of vitriol, and the acid partly neutralized with salt of tartar or whiting; *violet*, liquid archil, mixed with a little salts of tartar; *lilac*, liquid archil. These colors are usually applied to the petals with the finger.

FLOWERS, (IN CHEMISTRY.) Pulverulent or flower-like substances obtained by sublimation, as flowers of benzoin, zinc, sulphur, &c. The term has been discarded from modern chemical nomenclature, but is still commonly employed in familiar language.

FLOWERS OF CALOMEL. Calomel resublimed from a retort, with a very short, wide neck, kept too hot for it to condense on, into a receiver half filled with water, and sufficiently hot to steam. A fine white powder, possessing the same properties as ordinary calomel.

FLOWERS OF ZINC. *Syn.* FLORES ZINCI. ZINCUM CALCINATUM. ZINCI OXIDUM. (P. L. before 1824.) Oxide of zinc obtained by the rapid combustion of metallic zinc in a deep crucible, placed sideways in a furnace, so that the flowers may be collected as they form. Antispasmodic. *Dose.* 5 to 10 grs. in epilepsy, &c. Also used as a white pigment, but dries badly.

FLUID, ETCHING. I. (For copper.) *Prep* *a.* Aquafortis 2 oz.; water 5 oz.; mix.

b. To the last add verdigris 1 oz., and water 3 oz.; dissolve.

c. Verdigris, common salt, and sal ammoniac, of each 4 oz.; alum 1 oz., (all in powder;) strong vinegar 8 oz.; water 1 lb.; dissolve by boiling for a moment, cool, and decant the clear. This is the *eau forte* of Callot and Piranesi.

II. (For steel.) *a.* Iodine 1 oz.; iron filings ½ dr.; water 4 oz.; mix and dissolve.

b. Pyroligneous acid 4 oz.; alcohol 1 oz.; mix and add nitric acid 1 oz.; all by measure. This menstruum was employed and recommended by Mr. Turrel. For the method of using the above fluids, see ETCHING.

FLUID MAGNESIA. *Prep.* Place recently precipitated carbonate of magnesia in a bottle or other suitable vessel, and fill it by means of a soda-water apparatus with water fully charged with carbonic acid gas. With slight and cautious agitation the aerated water will become saturated with magnesia. A scruple of carbonate of magnesia put into a bottle, and thus treated, will be all taken up in from 20 minutes to half an hour, and the beverage left beautifully clear. (Geo. Raistrick. Chem. v. 42.)

FLUMMERY, (IN COOKERY.) A species of thick hasty-pudding, made with oatmeal or rice, flavored with milk, cream, almonds, orange-flowers, lemons, &c., according to fancy. *French flummery* is made with equal parts of blanc-mange and cream, sweetened and flavored. *Dutch flummery* is blanc-mange and eggs, flavored with lemon and sweetened. All these are poured into forms and served cold, to eat with wine, spirits, cider, &c.

d. Evaporate or distil off the spirit from the solution and washings as above; the residuum is sugar.

e. Dry the substances educed by the preceding operations by a *gentle* heat, and weigh them. The weight of the albumen may be taken with that of the gluten, as it possesses about the same nutritive value, and also because it has been asserted by some persons that the former substance is in reality gluten, and not albumen. By dividing the given weights by 10, the per centage value of the sample will be obtained. The pieces of filtering paper employed should be dried and weighed before using them; and the same degree of heat should be employed for this purpose, as that to which they will be afterwards exposed in the drying of the substances resulting from the operation.

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According to Vauquelin, French wheat flour contains about 10% of water, 11% of gluten, 71% of starch, 5% of sugar, and 3% of gum; and the water of the dough amounts to 50·3%.

FLOUR, BAKED. *Syn.* Farina tosta. F. Tritici Tosta. Astringent; used to make food for infants troubled with diarrhœa.

FLOWERS. *Syn.* Flores, (*Lat.*) Fleurs, (*Fr.*) Blumen, (*Ger.*) These beautiful and fragrant ornaments of our gardens, our sitting-rooms, and our chambers, are too well known to require description; but some remarks on their preservation, &c., may not be out of place here.

Flowers may be preserved in a fresh state for a considerable time, by keeping them in a moist atmosphere. When growing on the parent stem, the large amount of evaporation from the surface of their leaves, is compensated for by an equivalent proportion of moisture supplied by the roots; but when they are plucked, the evaporation from the surface continues, while the supply of moisture is cut off. Hence they fade, and that with a degree of rapidity exactly proportionate to the dryness of the air that surrounds them. It is on this account that recently-plucked flowers fade more rapidly indoors than in the open garden; for the air of a sitting-room is considerably *drier* and *warmer* than the external atmosphere. This is perfectly natural; for with diminished sources of nourishment, they are exposed to an augmented perspiration, and the water which forms the larger portion of their bodies is lost. In fact, they fade from the volatilization of one of their component parts, which is an essential constituent of every *living* flower. The flowers of plants also feed on the viewless oxygen of the air, and form carbonic acid with great rapidity. Thus those of the *passiflora serratifolia* consume of oxygen in this way 18½ times their bulk in 24 hours, when sheltered from the direct rays of the sun, at a temperature between 18° and 25° C.; the male flowers of the cucumber, 12 times their bulk; the female only 3½; the single red gilliflower (*cheiranthus incanus*) 11; the single tuberose 9; and the *typha latifolia* 9·8. (T. de Saussure, Ann. de Chim. xxi. 279.) To supply in part the loss of moisture by evaporation, has arisen the universal practice of placing them in water; but the mutilated stems possess a far inferior power of sucking up fluids to that of the roots, and though their decay may thus be slightly impeded, yet, as the balance of *gain* on the one hand by the roots, and *loss* on the other hand by evaporation from their whole surface, cannot be maintained, they fade as a natural consequence. To preserve them, or at least to render their existence less ephemeral, we have therefore only to restore this balance—to surround them with a medium that will rob them of no water; or, in other words, to place them in a moist atmosphere. "It is now eighteen years ago since we first saw, in the drawing-room of a gentleman, in the hot dry weather of the dog-days, flowers preserved day after day in all their freshness by the following simple contrivance:—A flat dish of porcelain had water poured into it. In the water a vase of flowers was set; over the whole a bell-glass was placed with its rim in the water. This was a 'Ward's case' in principle, although different in its construction. The air that surrounded the flowers being confined beneath the bell-glass, was constantly moist with the water that rose into it in the form of vapor. As fast as the water was condensed, it ran down the sides of the bell-glass back into the dish; and if means had been taken to enclose the water on the outside of the bell-glass, so as to prevent its evaporating into the air of the sitting-room, the atmosphere around the flowers would have remained continually damp. The only difference between plants in a 'Ward's case' and flowers in the little apparatus just described is this—that the former is intended for plants to grow in for a considerable space of time, while the latter is merely for their preservation for a few days; and that the air which surrounds the flowers is always charged with the same quantity of vapor, and will not vary with the circumstances, and at the will of him who has the management of it. We recommend those who love to see plenty of fresh flowers in their sitting-rooms in dry weather, to procure it. The experiment can be tried by inverting a tumbler over a rose-bud in a saucer of water." (Gardener's Chronicle.)

Faded flowers may be generally restored by immersing them half-way up their stems in very *hot* water, and allowing them to remain in it until it cools, or they have recovered. They must then be removed, the '*coddled*' portion of the stems cut off, and placed in clean cold water. In this way a great number of faded flowers may be restored, but there are some of the more fugacious kinds on which it proves useless.

To hasten the blowing of flowers the following liquid has been used with great advantage:—Sulphate or nitrate of ammonia 4 oz.; nitrate of potash 2 oz.; sugar 1 oz.; hot water 1 pint; dissolve and keep it in a well-corked bottle. *For use*, put 8 or 10 drops of this liquid into the water of a hyacinth-glass or jar for bulbous-rooted plants, changing the water every 10 or 12 days. For flowering plants in *pots* a few drops must be added to the water employed to moisten them. The preference

should be given to *rain* water for this purpose. A similar fluid, sold by Mr. Potter under the name of "liquid guano," is an excellent article to promote the growth and early flowering of plants.

Flowers may be produced in winter by taking up the plants, trees, or shrubs in the spring, at the time when they are about to bud, with some of their own soil carefully preserved among the roots, placing them upright in a cellar till Michaelmas; when, with the addition of fresh earth, they are to be put into proper tubs or vessels, and placed in a stove or hothouse, where they must every morning be moistened or refreshed with rain-water, to which a little of the solution above mentioned has been added. Thus in the month of February, fruits or roses will appear, and with respect to flowers in general, if they are sown in pots, at or before Michaelmas, and watered in a similar manner, they will blow at Christmas.

Flowers for medicinal purposes should be gathered as soon as unfolded, and dried as speedily as possible, at a gentle heat, the calices, claws, &c., being previously taken off; when the flowers are small the calix may be left on, or even the whole flowering spike dried without mutilation. *Labiate flowers* are usually dried in the latter state. *Blue flowers*, as those of violets, bugloss, &c., should be dipped for a moment into boiling water, before drying them, to prevent their becoming yellow or discolored. The color of the petals of red roses is best preserved by quick drying, after which the yellow anthers may be removed by sifting. The odor of roses and pinks is improved by this treatment. *Compound flowers*, with pappous seeds, ought to be gathered before they are entirely opened, and should be dried very high, to prevent the moisture developing the pappi, which by keeping would unfit them for medical use.

The best method of drying flowers is to spread them thinly on paper trays and place them in a stove-room, or a current of dry air, (preferably the latter,) or in the sun. For odorless flowers the temperature may be between 75° and 120° F., observing, however, not to employ sufficient heat to destroy their color. For fragrant and aromatic flowers the heat should not exceed 75°. The flowering tops of plants, as those of lavender, wormwood, melilot, &c., are usually tied in small parcels or bundles, loosely wrapped in paper, and then hung up, that they may not get discolored or broken. The succulent petals of some plants, whose odor is very fugacious, as some of the liliaceous kinds, cannot be well dried, as their fragrance is lost, and at the same time they rot and become discolored. (See VEGETABLES.)

FLOWERS, ARTIFICIAL. The beauty and value of these pleasing imitations of the vegetable kingdom mainly depend upon the taste and ingenuity of the maker. The delicate fingers of woman and her ready powers of imitation and invention, combined with her natural affection for the floral world, and her ready perception of the true and beautiful in nature and art, have enabled her especially to excel in this manufacture. At the present time, this art is carried to the greatest perfection by the female artificial florists of the French capital.

The French employ velvet, kid, and fine cambric for the petals, and taffeta for the leaves. Very recently thin plates of bleached whalebone have been used with great success for some portions of artificial flowers.

As *colors and stains*, the following are employed in Paris:—*Red*, carmine dissolved in a solution of salts of tartar, or in spirits of hartshorn; *yellow*, tincture of turmeric; *green*, a solution of distilled verdigris; *blue*, indigo dissolved in oil of vitriol, and the acid partly neutralized with salt of tartar or whiting; *violet*, liquid archil, mixed with a little salts of tartar; *lilac*, liquid archil. These colors are usually applied to the petals with the finger.

FLOWERS, (IN CHEMISTRY.) Pulverulent or flower-like substances obtained by sublimation, as flowers of benzoin, zinc, sulphur, &c. The term has been discarded from modern chemical nomenclature, but is still commonly employed in familiar language.

FLOWERS OF CALOMEL. Calomel resublimed from a retort, with a very short, wide neck, kept too hot for it to condense on, into a receiver half filled with water, and sufficiently hot to steam. A fine white powder, possessing the same properties as ordinary calomel.

FLOWERS OF ZINC. *Syn.* FLORES ZINCI. ZINCUM CALCINATUM. ZINCI OXIDUM. (P. L. before 1824.) Oxide of zinc obtained by the rapid combustion of metallic zinc in a deep crucible, placed sideways in a furnace, so that the flowers may be collected as they form. Antispasmodic. *Dose.* 5 to 10 grs. in epilepsy, &c. Also used as a white pigment, but dries badly.

FLUID, ETCHING. I. (For copper.) *Prep* *a.* Aquafortis 2 oz.; water 5 oz.; mix.

b. To the last add verdigris 1 oz., and water 3 oz.; dissolve.

c. Verdigris, common salt, and sal ammoniac, of each 4 oz.; alum 1 oz., (all in powder;) strong vinegar 8 oz.; water 1 lb.; dissolve by boiling for a moment, cool, and decant the clear. This is the *eau forte* of Callot and Piranesi.

II. (For steel.) *a.* Iodine 1 oz.; iron filings ½ dr.; water 4 oz.; mix and dissolve.

b. Pyroligneous acid 4 oz.; alcohol 1 oz.; mix and add nitric acid 1 oz.; all by measure. This menstruum was employed and recommended by Mr. Turrel. For the method of using the above fluids, see ETCHING.

FLUID MAGNESIA. *Prep.* Place recently precipitated carbonate of magnesia in a bottle or other suitable vessel, and fill it by means of a soda-water apparatus with water fully charged with carbonic acid gas. With slight and cautious agitation the aerated water will become saturated with magnesia. A scruple of carbonate of magnesia put into a bottle, and thus treated, will be all taken up in from 20 minutes to half an hour, and the beverage left beautifully clear. (Geo. Raistrick. Chem. v. 42.)

FLUMMERY, (IN COOKERY.) A species of thick hasty-pudding, made with oatmeal or rice, flavored with milk, cream, almonds, orange-flowers, lemons, &c., according to fancy. *French flummery* is made with equal parts of blanc-mange and cream, sweetened and flavored. *Dutch flummery* is blanc-mange and eggs, flavored with lemon and sweetened. All these are poured into forms and served cold, to eat with wine, spirits, cider, &c.

FLUOBORATES. *Syn.* Fluoborides Borofluorides. Hydrofluorborates. Compounds of fluoboric acid, with the salifiable bases. See the next article.

FLUOBORIC ACID. *Syn.* Terfluoride of Boron. A peculiar gaseous compound of fluorine and boron, discovered by Gay Lussac and Thénard.

Prep. Vitrified boracic acid 1 part; fluor spar 2 parts; mix, and expose the mixture to heat in a leaden retort. A colorless gas is evolved, which is rapidly absorbed by water, forming liquid fluoboric acid, (Gay Lussac, Thénard, Dr. Davy,) or boro-hydrofluoric acid, (Berzelius.) It does not attack glass, but rapidly destroys organic substances. Water absorbs 700 times its volume of this gas. (Davy.) See Borofluoride of Hydrogen.

FLUORIDES. Compounds of fluorine with the metals. (See Fluorine.)

FLUORIDES OF CHROMIUM. I. (*Sesquifluoride.*) *Prep.* Dissolve hydrated oxide of chromium in hydrofluoric acid and evaporate. A crystalline green mass.

II. (*Perfluoride. Fluochromic Acid.*) Fluor spar 3 parts; chromate of lead 4 parts; fuming (or the strongest) sulphuric acid 5 parts; mix cautiously in a silver or leaden retort. A red colored gas is evolved, which acts rapidly on gas, forming fluosilicic acid gas, and upon water, forming hydrofluoric acid and chromic acid. The moisture of the atmosphere is sufficient to effect this decomposition, the former substance escaping under the form of gas, and the latter being deposited in small crystals. (See Chromic Acid.)

FLUORINE. The electro-negative elements of hydrofluoric acid and the fluorides. This substance, though long known in combination, has only been lately obtained in a separate state. The honor of having first obtained it in an insulated form is due to Baudrimont, who procured it by passing fluoride of boron over minium heated to redness, and receiving the gas in a dry vessel. As thus obtained, it is not absolutely pure, being contaminated with small quantities of hydrofluoric and silico-fluoric acids. It has a yellowish color, and an odor between that of chlorine and burnt sugar. In this state it does not act on glass, but combines directly with gold. With hydrogen it forms *hydrofluoric acid*, and with the metals *fluorides*. The word *fluorine* was given to this substance from its existing in fluor or Derbyshire spar. The adjectitious term fluor, (from *fluo*, I flow,) was applied to this spar or mineral from its ready fusibility, and being sometimes used as a flux to promote the fusion of certain refractory minerals.

FLUOSILICIC ACID. *Prep.* Powdered fluor spar and silicious sand, or powdered glass, 1 part; concentrated sulphuric acid 2 parts; mix in a glass retort, apply a gentle heat, and collect the evolved gas over mercury.

Remarks. A colorless incombustible gas, highly corrosive, and poisonous, but does not act on glass vessels, when they are quite dry. Water absorbs 365 times its volume of this gas, (Dr. Davy;) but decomposition ensues, *pure hydrated silicic acid* being deposited in a gelatinous state, and a solution of hydrofluoric acid, containing only two-thirds of the silicic acid originally present in the gas, being formed. (Berzelius.) This solution is called *silicated fluoric acid*, or *silico-hydrofluoric* acid. It is acid and corrosive. By the action of water of ammonia fluosilicic acid gas is completely decomposed, depositing its silica. In this way Dr. Davy obtained $\frac{614}{1000}$ of its weight of the latter substance.

FLUX. *Syn.* Fluss, (*Ger.*) Flux, (*Fr.*) Fluor (*Lat.*, from *fluo*, I flow.) In Pathology, this term is occasionally applied to diarrhœa, cholera, and dysentery, but is nearly obsolete. In Chemistry, fluxes are substances of easy fusibility, which are added to others more refractory, to promote their fusion. The principal fluxes are the following:—

1. (*Black flux.*) Cream of tartar 2 parts; nitre 1 part; powder, mix, and deflagrate, by small quantities at a time, in a red hot crucible. This is merely carbonate of potash, mixed with charcoal in a finely-divided state. It is used for smelting metallic ores, and exercises a reducing action, as well as promoting the fusion.

2. (*White flux. Cornish refining flux.*) Cream of tartar and nitre, equal parts; deflagrate as last.

3. (*Morveau's reducing flux.*) Powdered glass (containing no lead) 1 lb.; calcined borax 2 oz.; powdered charcoal 1 oz.; mix. Used for the same purposes as black flux.

4. (*Cornish reducing flux.*) Cream of tartar 10 oz.; nitre 4 oz.; borax 3 oz.; mix.

5. (*Crude flux.*) Nitre mixed with twice its weight of tartar, without deflagration. Reducing.

6. Borax, tartar, nitre, sal ammoniac, common salt, limestone, glass, fluor spar, and several other substances are used as fluxes in metallurgy.

Remarks. On the large scale crude tartar is employed.

FOILS. (From *feuille, Fr.*, or *folium, Lat.*, a leaf.) Thin leaves of polished metal, put under stones or pastes, to heighten the effect. Foils were formerly made of copper, tinned copper, tin, and silvered copper, but the latter is that wholly used for superior work at the present day. There are two descriptions of foils employed, viz., *white*, for diamonds and mock diamonds, and *colored*, for the colored gems. The latter are prepared by varnishing the former. By their judicious use the color of a stone may be often modified. Thus, by placing a yellow foil under a green stone that turns too much on the blue, or a red one turning too much on the crimson, the hues will be brightened.

Prep. I. (*White or common foil.*) This is made by coating a plate of copper with a layer of silver, and then rolling it into sheets in the flatting mill. The foil is then highly polished or varnished.

II. (*Colored foils.*) These are made by coloring the preceding foil, highly polished, with certain transparent solutions or varnishes. The following produce beautiful colored effects, when judiciously employed:—

a. (*Blue.*) Prussian blue, (preferably Turnbull's,) ground with pale, quick-drying oil. Used to deepen the color of sapphires. It may be diluted with oil.

b. (*Green.*) 1. Pale shellac, dissolved in alcohol, (lacker,) and tinged green by dissolving verdigris or acetate of copper in it. 2. "Sesquiferrocyanuret of iron" and bichromate of potassa, of each ½ oz.; grind them with a stone and muller to-

a fine powder, add gum mastich (clean and also in fine powder) 2 oz.; grind again, add a little pyroxilic spirit, and again grind until the mass becomes homogeneous and of a fine transparent green; the beauty increases with the length of the grinding. The predominance of the bichromate turns it on the yellowish green; that of the salt of iron, on the bluish green. For use it is to be thinned with pyroxilic spirit." (Chemist, iii. 238.) This is used for emeralds. It may be brightened by adding a little yellow varnish.

c. (*Yellow.*) 1. Various shades of yellow may be produced by tinging a weak alcoholic solution of shellac or mastich, by digesting ***turmeric, annatto, saffron,*** or ***socotrine aloes*** therein. The former is the brightest and most fit for topazes. 2. Digest hay saffron in 5 or 6 times its weight of boiling water, until the latter becomes sufficiently colored, filter, and add a little solution of gum or isinglass. When dry, a coating of spirit varnish should be applied.

d. (*Red.*) Carmine dissolved in spirits of hartshorn, or a weak solution of salt of tartar, and gum added as above.

e. (*Garnet.*) Dragon's blood dissolved in rectified spirit of wine.

f. (*Vinegar garnet.*) Orange lake finely tempered with shellac varnish.

g. (*Amethyst.*) Lake and prussian blue, finely ground in pale drying oil.

h. (*Eagle marine.*) Verdigris tempered in shellac varnish, (alcoholic,) with a little prussian blue.

i. (*Ruby.*) 1. Lake or carmine, ground in isinglass. 2. Lake ground in shellac varnish. Used when the color turns on the purple. 3. Bright lake ground in oil; used when the color turns on the scarlet or orange.

k. (*Diamond.*) 1. Cover the inside of the socket in which the stone or paste is to be set with tin foil, by means of a little stiff gum or size; when dry, polish the surface, heat the socket, fill it with warm quicksilver, let it rest for two or three minutes, then pour it out and gently fit in the stone; lastly, well close the work round the stone, to prevent the alloy being shaken out. 2. Coat the bottom of the stone with a film of real silver, by precipitating it from a solution of the nitrate in spirits of ammonia, by means of the oils of cassia and cloves. (See SILVERING.) Both these methods vastly increase the brilliancy both of real and factitious gems.

Remarks. By the skilful use of the above varnishes, good imitations of the gems may be cheaply made from transparent white glass or paste, and when applied to foils set under colored pastes, (factitious gems,) a superior effect may be produced. The colors must be reduced to the finest state possible by *patient grinding*, as without this precaution, transparent and beautiful shades cannot be formed. The palest and cleanest mastich, and lac dissolved in alcohol, and also the palest and quickest drying oil should alone be employed, when these substances are ordered. In every case the colors must be laid on the foils with a broad soft brush, and the operation should be performed, if possible, at once, as no part should be *crossed*, or twice gone over while wet. If the color be not deep enough, a second coat may be given when the first one has become *quite* dry, but this practice is not to be recommended.

FOMENTATION. *Syn.* FOMENTUM, FOMENTATIO, FOTUS, (*Lat.*) FOMENTATION, (*Fr.*) I. Local bathing, with heated water, simple or medicated.

II. The liquid used for the above purpose. Fomentations are chiefly employed to allay pain and irritation, and to promote suppuration and the healthy action of the parts.

FOMENTATION. *Syn.* COMMON FOMENTATION. FOTUS COMMUNIS, (P. L. 1746.) Compound decoction of mallows.

FOMENTATION, ANODYNE. *Syn.* FOTUS ANODYNUS. *Prep.* (E. H.) Poppies 1 oz.; elder flowers ½ oz.; water 2½ pints; boil to 1½ pints. To relieve pain.

FOMENTATION, ANTISEPTIC. *Syn.* FOTUS ANTISEPTICUS. *Prep.* (Ger. H.) Decoction of bark lb. ij; infusion of chamomile lb. j; spirits of camphor f℥ij; muriatic acid f℈j; mix.

FOMENTATION, AROMATIC. *Syn.* FOTUS AROMATICUS. *Prep.* Sea wormwood, abrotanum and chamomiles, of each 1 oz.; laurel leaves ½ oz.; water 5 pints; boil to ½ gallon.

FOMENTATION, ASTRINGENT. *Syn.* FOTUS ASTRINGENS. F. ROBORANS. *Prep.* (P. H.) Bistort and pomegranate peel, of each 2 oz.; sal ammoniac ¼ oz.; red wine 1 pint; infuse at a gentle heat.

FOMENTATION FOR WORMS. *Syn.* FOTUS ANTHELMINTICUS. *Prep.* (P. Cod.) Leaves and flowers of tansy, wormwood, and chamomile, of each ℥iij; water lb. iij; boil to lb. ij.

FOMENTATION OF DIGITALIS. *Syn.* FOMENTUM DIGITALIS. *Prep.* (Guy's H.) Leaves of deadly nightshade, ℥j; boiling water lb. ij; infuse.

FOMENTATION OF HEMLOCK. *Syn.* FOMENTUM CICUTÆ. F. CONII. *Prep.* (St. B. H.) Fresh hemlock leaves, ℥ij; (or dried leaves, ℥j;) water 1½ pints; boil to a pint.

FOMENTATION OF ELDER FLOWERS. *Syn.* FOTUS SAMBUCI. *Prep.* (P. Cod.) Elder flowers ʒiij; boiling water 1 quart; macerate 1 hour.

FOMENTATION OF SAL AMMONIAC. *Syn.* FOMENTUM AMMONIÆ MURIATIS. *Prep.* (P. C.) Compound decoction of mallows ℥xxxij; sal ammoniac ℥j; dissolve, and add spirit of camphor ℥ij.

FOMENTATION, RESOLVENT. *Syn.* FOTUS RESOLVENS. *Prep.* (Richard.) Fomentation of elder flowers ℥viij; liquor of diacetate of lead ʒss; mix.

FOMENTATION, VINOUS. *Syn.* FOTUS VINOSUS. *Prep.* (P. Cod.) Red wine 1 quart; honey ℥ivss; dissolve.

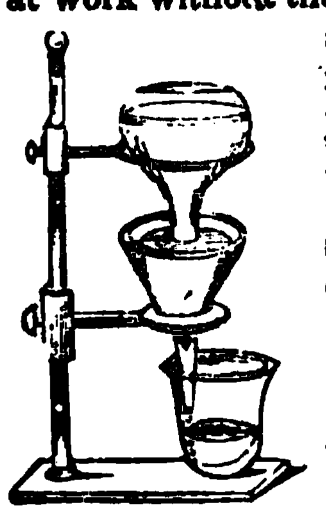
FORCEMEAT. *Syn.* FARCE. (In COOKERY.) A species of sausage meat, either served up alone, or employed as an ingredient in other dishes. Our notice of this article must be confined to the following extracts from a popular System of Cookery:—

"According to what it is wanted for should be the selection from the following list, observing that of the most pungent articles, least must be used. No one flavor should predominate greatly; yet if several dishes be served the same day, there should

the sides of the filter, and collected, by means of a small stream of water, in one spot at the bottom, and, when dry, should be swept off the paper or cloth with a camel-hair brush, and not removed by a knife, as is commonly done, unless it be of a very adherent kind.

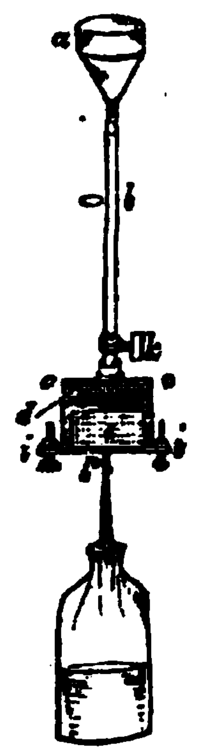
The first portion of liquid that runs through a filter is commonly foul, and should be pumped back or returned until it runs *clear*, when it may be caught in a proper receiver. In many cases, the liquid will not readily become transparent by simply passing through the filter; hence has arisen the use of filtering powders, substances which rapidly choke up the pores of the media in a sufficient degree to make the fluid pass clear. See POWDER. These powders should not be in too fine a state of division, nor used in large quantities, as they then wholly choke up the filter, and absorb a large quantity of the liquid. For some liquids, these substances are employed for the purpose of *decoloring* or *whitening* them. In such cases, it is preferable, first to pass the fluid through a layer of the substance in coarse powder, from which it will run but slightly contaminated into the filters; or, if the substance be mixed with the whole body of the liquid, to pass it through some coarser medium, to remove the cruder portion before allowing it to run into the filter. Granulated animal charcoal is used, according to the first method, to decolor sirups, oils, &c.; and filtering powder by the second, to remove a portion of the color, and to clarify castor oil. The common plan of mixing large quantities of filtering powder with this oil, and throwing the whole into the filter, as adopted by the druggists, is injudicious. When *simple filtration* is required, it is better to use but *little* or no powder, and to continue returning the oil that runs through until it filters quite clear. By this plan the same filters may be used for a long period of time, and will continue to work well; but by the usual method, they rapidly decline in power, and soon scarcely deliver their contents at all.

It is often of great advantage to render a filter self-acting, or to construct it in such a way that it may feed itself, so that it may continue full and at work without the constant attention of the operator. On the *small scale*, this may be readily effected on the principle of the common fountain lamp, (see eng.;) and on the *large scale*, by placing the vessel containing the unfiltered liquid on a higher level than the filter, and by having the end of the supply-pipe fitted with a ballcock, to keep the liquid in the filter constantly at the same height.



The rapidity of filtration depends upon the *porosity of the filtering medium—the extent of filtering surface—the relative viscidity or limpidness of the filtering liquid, and the porosity and fineness of the substances it holds in suspension.* The most efficient filter is produced, when the first two are so graduated to the latter, that the liquid filters rapidly, and is rendered perfectly transparent.

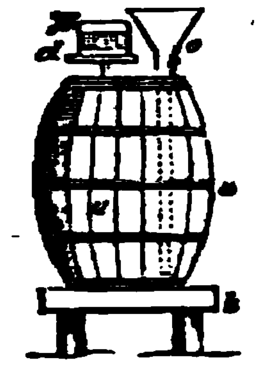
To the preceding causes that influence filtration may be added the *pressure* or force by which the liquid is impelled through the pores of the filter. In the common method of filtration no pressure is exerted beyond that of the weight of the column of the liquid resting on the filtering medium, but in some cases additional pressure is employed. This is done for the purpose of producing more rapid filtration, or for filtering liquids that, from their viscidity, will scarcely pass through the pores of substances sufficiently fine to remove their foulness in the ordinary way. One of the easiest means of employing pressure in filtration is to increase the height of the column of the filtering liquid. From the peculiar properties of fluids, by which they transmit pressure in all directions, this column need not be of equal diameter throughout, but may be conveniently contracted to the size of a small pipe, as in the accompanying engraving, which represents a small filter on this construction at work. *a* is the funnel or reservoir of foul liquid; *b* a small pipe conveying the liquid to the filter; *c c* a chamber, of which the upper portion *d* is filled with the descending liquid, and the lower portion *e* with the filtering media; *i i* are screws by which the bottom plate is fastened on; which plate is removed to clean out or renew the filter. For use, the cocks *k* and *l* are closed, and the liquid poured into the funnel *a*; the cock *k* is next opened, and, in a few minutes after, the cock *l*, when an uninterrupted flow of filtered liquor will be obtained as long as any fluid remains in the funnel *a*, and the tube *b*. The length of the latter determines the degree of pressure. Care must be taken to pass the foul liquid through a hair sieve, or some other strainer, to remove any substance that might choke up the pipe *b*. Another mode of employing pressure in filtration is the withdrawal of the air from the receiving vessel, as in the *vacuum filter*, by which a pressure of about 14½ lbs. to the inch becomes exerted on the surface of the liquid by the atmosphere. The vacuum in the receiving vessel may be produced by the air-pump or by steam. (See CONGELATION.) A commoner method of applying pressure than the last is to condense the air over the surface of the liquid by means of a forcing-pump, or by steam. On the small scale, pressure may be applied to filtration, by employing a syphon, whose shorter leg has its mouth blown into the shape of a bell or funnel, over which filtering paper or fine calico may be stretched.



The application of pressure to filtration is not always advantageous, and beyond a certain limit, becomes objectionable. It is found in practice that fluids under pressure take a longer period to run clear than without pressure, and that ruptures of the media more frequently take place with the *former* than the *latter*. Great pressure is in no case advantageous.

The filters already noticed are those that act by the fluid descending through the media; but in some cases, the reverse method is employed, and the liquid filters upwards, instead of downwards. These are called *ascending filters*, and are often

preferable to those on the descending principle, because the suspended matters that require removal by filtration usually sink, and thus a portion escapes being forced into the pores of the filter. They are also more convenient, when pressure is employed. Their construction depends upon the same principles as the common filter, and merely requires that the feeding vessel should be higher than the upper surface of the filtering media. *Oils* are conveniently filtered in this way, because of their little specific gravity. By fixing a small filter on this principle into the head of a cask, and pouring in water through a funnel, whose neck reaches nearly to the bottom of the cask, the oil will float up and pass the filter, leaving the sediment behind. In cold weather, hot water may be employed.



a, Cask of oil. *b*, Stand. *c*, Funnel for water. *d*, Filter.

In some cases, the upward and downward systems of filtration are united in the same apparatus, and this method is advantageous where room is an object. For this purpose, it is merely necessary to connect the bottom of an ascending filter with the top of a descending one, or the reverse; the proper pressure being in either case applied. (See CLARIFICATION, DEFECATION, &c.)

FININGS. A solution of gelatin, used to clarify beer, wine, &c.

Prep. Isinglass (ordinary) 1 lb.; stale beer, cider, or vinegar, 3 or 4 pints. Mix, and macerate until the former becomes gelatinous, then reduce it to a proper consistence with weak, mild beer, cider, or any other liquid that the finings are intended for.

Remarks. A pint, or more, is the usual dose for a barrel of beer or porter, and a quart for a hogshead of wine. (See the latter part of the article BREWING.)

FIRE EATING. The power of resisting the action of fire is given to the skin, by frequently washing it with diluted sulphuric acid, until the part becomes sufficiently callous. It is said that the following mixture is very efficacious:—dilute sulphuric acid 3 parts; sal ammoniac 1 part; juice of onions 2 parts; mix. It is the acid, however, that produces the effect.

FIREPROOF STUCCO. *Prep.* Moist gravelly earth, (previously washed,) made into stucco with the following composition:—pearlashes 2 parts; water 5 parts; common clay 1 part; mix.

Remarks. This is said to cost about 1*s.* 6*d.* per hundred square feet. It has been tried on a large scale and found to answer well. It is used for wood, &c.

FIRES. Our notice of this subject must necessarily be limited, for want of space. Fires are but too frequently said to arise by accident, which is merely a condensed phrase, equivalent to *carelessness* and *recklessness.* There are few fires that might not have been prevented by the exercise of *common prudence*, and a vast number that have been caused by *negligence*, arising from sheer *laziness.* As familiar instances may be mentioned, the permitting of sparks to fall on the ground and remain there, without extinguishing them; carrying a *naked* candle into rooms containing inflammable substances, &c.

Prev. 1. Avoid leaving your candle burning at the side of your bed, but place it on a table or the floor, at a respectable distance from any article of linen, or other equally inflammable substances. *Rush, wax, or floating lights* are the safest for night burning. The practice of reading in bed cannot be too much censured; it is a common cause of fires. 2. Never set aside a bucket or box containing hot ashes, or cinders, in a closet. 3. Never throw a piece of lighted paper, cigar, or other ignited substance, on the floor; and should such fall by accident, immediately extinguish them by treading on them. 4. Never blow gas-lights out, but always extinguish them by turning off the supply. 5. Should the smell of gas be strongly perceived, immediately turn off the cock at the meter, and avoid carrying a lighted candle into the part where the escape has taken place, before the gas has been removed by thorough ventilation; attention to this point will prevent the possibility of an explosion. 6. Have your chimneys kept in a clean state by frequent sweeping.

Fires might often be readily extinguished when first discovered by the timely application of a few buckets of water. When an apartment is discovered on fire, the door, chimney, and windows should be immediately closed, if possible, and only opened for the purpose of projecting water on the flames. By this means the supply of air will be cut off, and rapid combustion prevented. The neglect of this precaution has often caused a mere smouldering fire, that might have been easily put out, to burst into an inextinguishable mass of flame. It has been proposed to add common salt or pearlash to the water thrown on fires, as even a weak solution of those substances speedily stops combustion. Such a plan is very plausible, and may easily be applied, by adding the saline matter to the buckets of water used to feed the engine for the first few minutes of its working; but when a fire has acquired any extent, the action of such substances becomes scarcely perceptible.

Fires on board ships. The extinction of fires at sea, by means of carbonic acid gas, has been suggested to the Admiralty by Mr. J. R. Hancorn, surgeon. He says—"The antidotal effects of *carbonic acid gas* upon combustion are well known to every experienced chemist; and I am convinced, by practical experiments, that a simple and economical apparatus might be attached without inconvenience to every decked vessel. Carbonic acid gas is a well-known non-supporter of combustion, and will *extinguish fire at the very instant of coming in contact* with burning matter. Chalk will yield, with sulphuric acid, (vinegar, or any other acid will do,) 44 per cent. of the gas: hence, a ton of chalk, and a fourth part of that quantity of sulphuric acid, will be found sufficient to extinguish any fire on board a ship *The plan is peculiarly adapted to a ship, because she can be battened down so as to exclude the atmosphere.* A small leaden gasometer is all the apparatus required, having a curved tube, and which, being portable, may be placed over the burning part, while a hole may be cut in the deck sufficiently large to admit the tube. Carbonic

acid gas *expands with heat*, and being *heavier* than the atmosphere or smoke, immediately *descends, by its own gravity*, upon the burning mass. I may further mention the utility of the apparatus in destroying vermin in ships, such as rats and cockroaches, being more easily applied, and more effectual, than the usual method." (Chemist, iii. 279.) This plan has been rejected by the Admiralty because of the destructive action of the gas on human life, as well as on fire. But "it surely is possible by mechanical means to expel the gas before again entering the ship's hold. At any rate, the grand point would be obtained of extinguishing the fire—though the crew might have only the *deck* to stand on. The frequency of these disasters has become distressing." (Ed. of the Chem.)

Escape from apartments on fire may generally be readily effected by creeping on the hands and knees. In this way the window or door may be reached. It is found that the atmosphere of a room so full of smoke as to produce suffocation to a person standing upright, may generally be safely breathed, on nearly a level with the floor. Should descent by the staircase be found impossible, then the window should be immediately sought. Here *presence of mind* is of the utmost importance. If a ladder or fire-escape be not provided by those without, a rope should be made by tying the sheets and blankets of the bed together, one end of which should be firmly secured to a chair, table, or preferably one of the bedposts, and with this apparatus descent should be cautiously attempted. Jumping out of the window should be avoided, as persons who have not been brought up as clowns or harlequins, run just as much danger in performing such an exploit as they do by remaining in the burning building. Persons have frequently lost their lives by hastily throwing themselves out of window, under the dread of being burnt alive, who would have been rescued by those without, had they waited but a few moments longer. When it is impossible to escape from a burning building by the stairs or windows, retreat may be sometimes secured by a trapdoor opening on to the roof, or by a skylight, when, unless it be an isolated house, the roof of one of the adjoining buildings may probably be gained with safety, provided common caution be observed.

Fire-escapes of various kinds have been invented of late years, and employed with indifferent success at many fires in the metropolis. Of these, the one that has been most generally approved of, is that invented by Captain Manby, consisting of a stout rope furnished with nooses, distended by flat rests for the feet, at convenient distances for stepping from one to the other. The one end of this rope is provided with a stout hook, or grappling-iron, by which it may be fastened to the sill of a window, post of the bedstead, or any other convenient object. By means of this apparatus a descent may be safely made from a considerable height. To avoid the risk of this *escape* catching fire, it has been proposed to make it of iron chain; but it thus becomes heavy and inconvenient. The best plan is to imbue the rope with some substance that will render it incombustible; mere water would be sufficient.

It is said that there is no instance on record of a person being burnt to death in dwelling-houses in *Edinburgh*, where the houses are usually high; yet in *London*, where fire-engines and fire-escapes are provided in greater numbers, deaths are frequent from this cause. The reason of this difference is, that in the former city, the stairs are all of *stone*, by which means a road of escape is secured.

The clothes of females and children, when on fire, may be most readily extinguished by rolling the sufferer in the carpet, hearth-rug, table-cover, a great-coat, cloak, or any other woollen article at hand. If this be expertly done, the flames will be rapidly put out. Should assistance not be at hand, the person whose clothes are on fire should throw herself on the ground, and roll the carpet round her, as before described; or if such a thing is not in the room, she should endeavor to extinguish the flames with her hands, and by rapidly rolling round and round on the floor. In this way the fire will be stifled, or at least the combustion will proceed so slowly that less personal injury will be experienced before assistance arrives. But if, on the contrary, the party whose clothes are on fire remains in an upright position, the flames will naturally ascend, and scorch the face, and other unprotected parts of the body. The advantage of assuming the horizontal position is also manifest from the fact, that *nine* times out of *ten* it is the lower parts of the dresses of females that first catch fire. A lady's muslin dress taking fire at the skirt would burn from bottom to top, and produce a fatal density of flame in half a minute, while she is standing upright; but when lying down, even though she took no pains leisurely to extinguish the flames, ten minutes would probably elapse before it would be consumed, and the flame might at any instant be extinguished by the thumb and fingers. It merely requires the exercise of ordinary presence of mind. (See ACCIDENTS.)

The addition of ½ oz. or 1 oz. of alum or sal ammoniac to the last water used to rinse a lady's dress, or a less quantity added to the starch used to stiffen it, would render it uninflammable, or at least so little combustible that it would not *readily* take fire; and if it did, would be *slowly* consumed *without* flame. Had this precaution been adopted, the late lamentable accident at one of our national theatres might have been avoided. (See CLOTH, INCOMBUSTIBLE.)

It is often difficult to get horses out of buildings on fire, but it is said that they will readily come out if the saddle and bridle, or harness to which they are accustomed, be thrown over them as usual.

FISH. *Syn.* PISCIS, (*Lat.*) POISSON, (*Fr.*) Fish are a wholesome species of food, but are less nutritious than the flesh of animals, or the grains of the cereals. Of all the various substances used as aliments by man, fish are the most liable to run into a state of putrefaction, and should therefore be only eaten when perfectly fresh. Those that are the whitest and most flaky when cooked, as *whiting, cod, flounders, soles, haddock, turbot, hake*, &c., are the most easily digestible; and those abounding in oily matter, as *salmon, eels, herrings*, &c., are most nutritious, though more likely to offend the stomach. Salt-water fish has been said

to be more wholesome than river fish, but without sufficient reason. *Salted fish* is very hard of digestion, unless well cooked. The frequent use of fish as an aliment is said to promote the sexual feelings, but not the increase of population, unless a sufficiency of other food (animal) be taken at the same time. Skin diseases are also said to be more common among those who live continually on fish, but this probably arises from their use not being accompanied by a proper quantity of fresh vegetables. Fish consist of about 80% of water, 14% of albumen and fibrine, and 6% of gelatin, making about 20% of nutritive matter. (Brande.) Acid sauces and pickles are the proper additions to fish, from their power of retarding the progress of putrefaction, and of correcting the relaxing tendency of large quantities of oil and butter.

Caution. It sometimes happens that a fish-bone accidentally swallowed will remain in the œsophagus, and occasion serious inconvenience; in fact, instances have been known where so much irritation has arisen that death has followed. In such cases it is advisable, as soon as possible, to take four grains of tartar emetic, dissolved in ½ pint of warm water, and immediately afterwards the white of six eggs. The coagulated mass will not remain in the stomach more than two or three minutes, and the remedy has been known to "remove no less than 24 pins at once."

Choice, dressing, &c. "The flesh of any fish is always in the highest perfection, or in season, as it is called, during the period of the ripening of the milt and roe. After the fish has deposited the spawn, the flesh becomes soft, and loses a great deal of its peculiar flavor. This is owing to the disappearance of the oil or fat from the flesh, it having been expended in the function of reproduction." (Fleming's Phil. of Zoology.) Fish should be dressed as soon after being caught as possible, as much of their peculiar delicacy and flavor is lost by keeping, even for a few hours. Turbot and salmon are said by the fishmongers to be improved in flavor when two or three days old, but this is surely a mistake, as the former, when dressed immediately after being caught, possesses a fine creamy taste which it afterwards loses; while the latter, by the loss of a *single tide*, loses a portion of the fine white curd which intervenes between the flakes, and by longer keeping, this curd and the larger flakes disappear altogether. In the eyes of some epicures, the richness is, however, increased by this change. Mackerel and some other fish suffer so much from keeping only a few hours, that they become quite unwholesome. On this account the former are permitted to be publicly vended on Sundays. Herrings offer a remarkable example of the advantage of dressing fish as fresh as possible. When cooked soon after being caught, they possess considerable delicacy and flavor, but by keeping for only a few hours, the oil separates from the flesh, and they become soft, greasy, and strong-flavored.

In the choice of every kind of fish, stiffness, brightness of the eyes, and redness of the gills may be regarded as invariable signs of freshness. A peculiar elasticity will also be perceived in fish recently caught; little or no permanent impression being made by the ordinary pressure of the fingers, from the flesh immediately rising when the pressure is withdrawn. Fresh fish also lie in a partly curled position, and never quite straight, as is the case when they have been kept for some time Thickness and fleshiness are deemed marks of the good condition of all fish.

On the proper cleaning of fish preparatory to dressing it, depends much of its delicacy and flavor. Ordinary cooks seldom do this *well*, from not slitting the fish sufficiently open to permit the inside to be *thoroughly* washed, and seldom using sufficient water. The superior flavor of fish cleaned by the fishmongers arises from their performing the operation more completely, and from the large quantity of water they employ about them. The flavor of all fish is improved by adding a little salt or vinegar to the last water in which they are washed. The sound, milt, and roe should be carefully cleaned and preserved.

Fish is preferably cooked by simple *boiling*, *broiling*, or *frying;* in fact, the finer kinds of fish are often injured by the excessive interference of the cook. When boiled, the fish should be put on the fire in cold water, and as soon as a scum rises from boiling, it should be removed by the skimmer. The addition of a little salt or vinegar to the water improves the flavor of most fish, and renders the flesh firmer. Fish is known to be sufficiently dressed by the flesh in the thicker parts separating easily from the bone. When this is the case, it should be removed from the kettle, as by soaking in the water it loses its firmness. *Sole, skate*, and *mackerel* are usually put into boiling water. *Fish for broiling* should be well washed in strong vinegar, wiped dry with a towel, and floured before placing them on the gridiron; and the bars of the latter should be *hot*, and well buttered. *Fish for frying* should be prepared as for broiling; and the butter, oil, or lard should be allowed to boil for a minute or two before putting them into the frying-pan. The latter should be perfectly smooth and bright, and the butter or oil in abundance, to prevent the fish sticking to it and burning. When removed from the pan, the superfluous fat should be drained from them, preparatory to serving. When fish is divided into fillets or cutlets before being cooked, it is usual to take out the bones, and to dress it with forced meat, &c.

In serving fish of the finer kinds, no other additions are required than melted butter and the ordinary fish sauces and pickles. The dish should be garnished with *raw* parsley for the sake of appearance, but boiled parsley, chopped small, should accompany it. All kinds of fish should be served on a napkin.

Pres. Fish may be preserved in several ways:—

I. By either wet or dry salting.

II. By simply drying after cleaning them.

III By salting them and then drying them.

IV. By placing them in jars, pouring salad oil over them, and tying them over *air-tight*.

V. By dipping them into, or brushing them over with pyroligneous acid, and then drying them. This gives a smoky flavor, but if pure acetic acid (P. L.) be used, no taste will be imparted. It may be applied by means of a clean painter's brush, or even a stiff feather. A tablespoonful is sufficient to brush over a large surface. Fish and flesh so prepared will bear a voyage to the East Indies and back uninjured.

VI. Fish may be preserved in a living state for 14 days or longer without water, by stopping their mouths with crumb of bread steeped in brandy, pouring a little brandy into them, and then placing them in straw in a moderately cool situation. (Prechtl. Encycl. Techn.)

VII. Immersion of the *cleaned* fish in water holding in solution $\frac{1}{300}$ or $\frac{1}{400}$ part of creosote, and then drying them.

VII. Fish may be preserved in a dry state, and perfectly fresh, by means of sugar alone. Fresh fish may be thus kept for some days, so as to be as good when boiled as if just caught. If dried and kept free from mouldiness, there seems no limit to their preservation; and they are much better in this way than when salted. The sugar gives no disagreeable taste. This process is particularly valuable in making what is called *kippered salmon;* and the fish preserved in this manner are far superior in quality and flavor to those which are salted or smoked. A few tablespoonfuls of brown sugar are sufficient for a salmon of five or six pounds weight; and if salt be desired, a teaspoonful may be added. Saltpetre may be used instead, in the same proportion, if it be wished to make the kipper hard. (See ANIMAL SUBSTANCES USED AS FOOD.)

FIXATEUR. *Syn.* BANDOLINE. *Prep.* Soak Iceland moss in cold water for an hour or two, drain and dissolve in boiling water.

Remarks. A solution of gum arabic in water is also commonly called by the same name. It is used by ladies to make their hair curl firmly, and remain in any required position. It is applied by moistening the fingers, and passing the hair through them. Beer has a similar effect.

FLANNEL. It has been shown by the experiments of Count Rumford that the conducting power of the different materials employed for clothing varies considerably. A thermometer, surrounded with cotton-wool, and heated by immersion in boiling water, took 1046 seconds to lose 135°, when plunged into a bath of melting ice; but, under the same circumstances, when sheeps' wool was employed, 1118 seconds elapsed before a like sinking of the thermometer took place, (Phil. Trans. 1792;) thus showing the greater conducting power of the former, and consequently the superiority of the latter substance for the manufacture of warm clothing. But the chief advantage of wool as an article for under-clothing depends less upon its actual power of conducting heat than its peculiar texture. Flannel acts as a gentle stimulus on the skin, and exercises the most beneficial action, by keeping the pores clean, and in a state most favorable to perspiration. It has also the advantage of absorbing the perspiration as soon as emitted, and allowing its watery portion to pass off into the atmosphere almost as soon as formed, but this is not the case with cotton and linen fabrics. The different effects of flannel and linen are particularly perceptible during brisk exercise. When the body is covered with the former, though perspiration be necessarily increased, the perspired matter freely passes off through the flannel, and the skin remains dry and warm. If the same exercise be taken in linen shirts, perspiration, as in the former case, is indeed also increased, but the perspired matter, instead of being dispersed into the atmosphere, remains upon the linen, and not only clogs the pores of the skin, but gives a disagreeable sensation. From this property of flannel, persons who wear it next the skin seldom catch cold from changes of temperature, even though perspiring profusely; but in similar cases, when linen or calico shirts are worn, chilliness immediately comes on, followed by "*sniffling, sneezing*, and *cough*," and all the other symptoms of severe catarrh.

The common objections raised against the use of flannel are founded on vulgar prejudices, arising from ignorance, obstinacy, or bravado, and are undeserving of the notice of sensible people. In a fickle and moist climate like that of England, every person should wear a robe of flannel next the skin, or at all events a waistcoat of flannel reaching below the loins; and this should not be discarded as soon as the cold weather has passed, but its use should be continued all the year round; for in reality, flannel is, if possible, even more required in summer than in winter, because persons perspire more freely in hot than in cold weather, and are consequently more susceptible of cold, while at that period of the year their clothing is less capable of protecting them from the effects of sudden changes of temperature, and draughts of cold air, moisture, &c. Females, children, persons of delicate constitutions, and all others, who, from their habits of body or life, perspire freely, or are much exposed, should wear flannel.

In washing flannels, it is said they should be always put into scalding hot water, by which method their color will be preserved, and they will be prevented from shrinking.

FLASH. *Prep.* Burnt-sugar coloring 1 gall.; fluid extract of capsicum, or essence of cayenne, ½ pint, or enough to give a strong fiery taste.

Use. It is employed to color spirits, and to give them a false strength. It is made by the brewers' druggists, and vended under the name of "*isinglass and burnt sugar.*"

FLATULENCY. (From *flatus*, a blast.) A morbid collection of gas in the stomach and bowels. The most common cause of flatulency is indigestion. When the natural fluids of the stomach are secreted in a healthy state, they exercise an antiseptic and digestive action on the food, by which it is speedily reduced to a magma that is little liable to spontaneous change while in the body; but when the reverse is the case, fermentation rapidly commences, and the stomach and associated viscera become distended with gas, giving rise to frequent eructation and crepitation. The quantity of gas thus accumulated is often enormous. It is asserted that an ordinary apple during fermentation yields about 600 times its bulk of gas, and many vegetables much more. (Dr. Hales.) It is, therefore, not at all surprising that so much inconvenience should be felt from flatulency.

Treat. The treatment of flatulency consists mainly in the selection of proper articles of food. Oleraceous vegetables, peas, beans, and indigestible fruits, should be especially avoided, as well as the use of large quantities of washy liquids. The diet should consist principally of animal food, well cooked, with a sufficient quantity of good potatoes and wheaten bread, moderately seasoned with spices; and the most suitable beverages are toast and wa-

ter, and good brandy largely diluted with water. The healthy tone of the stomach may be re-established by the proper use of tonics, bitters, and mild aperients. (See DYSPEPSIA.)

To relieve the *fit of flatulency*, carminatives and aromatics, as peppermint, ginger, cinnamon, lavender, and the peppers, may be had recourse to. A glass of peppermint cordial, or brandy strongly flavored with essence of peppermint, or mixed with a spoonful of powdered ginger, is a popular and efficient remedy.

FLIES often cause considerable annoyance to the person in hot weather, and frequently do considerable damage to handsome furniture, especially picture-frames, gilding, &c., by alighting on them. The best way to remove them is to expose in a plate a mixture of 1 teaspoonful of black pepper, 2 teaspoonfuls of brown sugar, and 1 tablespoonful of cream; or a solution of sugar in a strong decoction of quassia, may be used instead. It is said that either of these mixtures will cause them rapidly to disappear.

Flies and other insects may be kept from attacking meat by dusting it over with pepper, powdered ginger, or any other spice, or by skewering a piece of paper to it on which a drop of creosote has been poured. The spices may be readily washed off with water before dressing the meat.

FLOUNDERS are a wholesome species of fish. They are both a sea and river fish; the latter are, however, preferred. They should be chosen by their *thickness* and *firmness*, and the *brightness of their eyes*. They are in season from January to March, and from July to September. They are nicest when dressed by frying in oil.

FLOUR. *Syn.* FLEUR DE FARINE, (*Fr.*) FARINA, (*Lat.*) The meal of bread corn. Of farinas the principal is wheat flour, or the ground seed of the Triticum hybernum vel vulgare, of which there are several varieties, chiefly depending on the amount of bran they contain, and the fineness of the sieves through which they are passed.

Fine wheat flour. (*Ador, Farina, F. tritici, F. seminis tritici.*) The finest flour obtained by sifting the meal produced in the first grinding of wheat between sharp stones, by a sieve of 64 wires to the inch; used for pastry.—*Middlings.* The remainder of the flour of the first grinding that will pass through a coarser sieve; used for making household bread, but is mostly reground.—*Seconds.* The finest part of the flour, obtained by grinding middlings over again, between blunt stones; used for making bakers' fine wheaten bread.—*Pollard.* The coarse flour, from whence the seconds has been sifted; used for making sea biscuits and gingerbread, and to fatten poultry and hogs.—*Country household flour.* Is usually ground only once, and sifted to four-fifths of the weight of the wheat. —*Ammunition flour.* Is required to be ground and sifted to $\frac{1860}{2233}$, or very nearly five-sixths the weight of the wheat. Thirty-two pecks of wheat in the London mills yield 38½ of flour, 8 of pollard, and 12 of bran, (*furfur tritici;*) the bulk of the wheat being doubled by grinding. (Accum.)

Pur. This article of food is very frequently adulterated both by the miller and the baker, as has been before alluded to in the article on BREAD. This fraud may, however, be readily detected by the following tests, which refer to *wheat flour.*

1. Wheat flour is distinguished by its cohesiveness, which is so great, that on being squeezed in the hand, the lump will be some time before it loses its shape.

2. *Plaster of Paris, ground bones, chalk, and potato flour*, when added to wheaten flour, may be detected by the specific gravity of the sample being considerably greater than that of pure flour. This may be readily ascertained by any person, by filling a small vessel with some pure flour, and then with the given sample. "A vessel which will contain 1 lb. of wheat flour will contain 1½ lbs. of fecula," (potato flour;) and hence "the proportion of this adulteration may be easily estimated." (Ure.)

3. Liquid ammonia (aqua ammoniæ puræ) turns wheat flour yellow; and if any other corn has been ground with it, pale brown; or if peas or beans have been ground with it, a darker brown.

4. Nitric acid turns wheat flour of an orange yellow color, but forms a stiff and tenacious jelly with potato fecula, the color of which it does not alter. (See ARROW-ROOT, BRITISH.)

5. Pure muriatic acid, when poured on potato flour, develops a smell of rushes; it also dissolves starch, but changes the color of wheat flour to a deep violet.

6. *Bean and pea flour* may be detected by pouring boiling water on the sample, or by making it into bread and toasting it, when the peculiar odor of those substances will be evolved.

7. The value of wheat flour as an aliment depends upon the quantity of gluten, sugar, starch, and phosphate of lime it contains; and its superiority over the flour of the grains of the other cereals, depends on its containing a larger proportion of the first and last of these substances. The qualitative analysis of flour is very simple, and may be easily made by persons unacquainted with chemistry. The following plan will be found to be a ready method of determining the proportion of the principal ingredients just named:—

a. Make 1000 grs. of flour into a dough with a little water, let it rest an hour, and then *gently* knead it in successive waters, until the starchy particles are perfectly removed. Collect the portion (gluten) left in the hand, drain off the water, place it on a piece of filtering or blotting paper, several times doubled, and set it aside.

b. Mix the several waters employed in the preceding process, and set them aside in a tall vessel, to deposite the suspended portion, (starch.) After a sufficient time, pour off the clear liquid, and throw the *whole* of the sediment on a *weighed* paper filter, placed in a funnel, observing to remove the portion adhering to the bottom of the vessel by means of a little clean water, that none may be lost.

c. Evaporate the decanted liquid, as well as what runs from the filter, until it becomes curdy, then filter through a piece of weighed blotting paper, and preserve the sediment, (albumen;) next evaporate to the consistence of a sirup, agitate with 10 times its weight of alcohol, and filter, observing to wash the paper clean with a little alcohol, after the solution has passed through it. The substance on the paper is phosphate of lime and gum,* and must be set aside.

* By digestion in water, filtration, and evaporation, the two may be obtained separately.

d. Evaporate or distil off the spirit from the solution and washings as above; the residuum is sugar.

e. Dry the substances educed by the preceding operations by a *gentle* heat, and weigh them. The weight of the albumen may be taken with that of the gluten, as it possesses about the same nutritive value, and also because it has been asserted by some persons that the former substance is in reality gluten, and not albumen. By dividing the given weights by 10, the per centage value of the sample will be obtained. The pieces of filtering paper employed should be dried and weighed before using them; and the same degree of heat should be employed for this purpose, as that to which they will be afterwards exposed in the drying of the substances resulting from the operation.

Remarks. This method of ascertaining the actual value of any sample of flour as an article of food, though not strictly accurate, approximates sufficiently to the truth for all practical purposes, and is well adapted to the wants of the baker and large purchaser. In many cases it will only be necessary to perform the first part of the process, *a*, which will give the amount of the most important constituent of the flour; the rest being of minor consequence.

According to Vauquelin, French wheat flour contains about 10℥ of water, 11℥ of gluten, 71℥ of starch, 5℥ of sugar, and 3℥ of gum; and the water of the dough amounts to 50·3℥.

FLOUR, BAKED. *Syn.* Farina tosta. F. Tritici Tosta. Astringent; used to make food for infants troubled with diarrhœa.

FLOWERS. *Syn.* Flores, (*Lat.*) Fleurs, (*Fr.*) Blumen, (*Ger.*) These beautiful and fragrant ornaments of our gardens, our sitting-rooms, and our chambers, are too well known to require description; but some remarks on their preservation, &c., may not be out of place here.

Flowers may be preserved in a fresh state for a considerable time, by keeping them in a moist atmosphere. When growing on the parent stem, the large amount of evaporation from the surface of their leaves, is compensated for by an equivalent proportion of moisture supplied by the roots; but when they are plucked, the evaporation from the surface continues, while the supply of moisture is cut off. Hence they fade, and that with a degree of rapidity exactly proportionate to the dryness of the air that surrounds them. It is on this account that recently-plucked flowers fade more rapidly in-doors than in the open garden; for the air of a sitting-room is considerably *drier* and *warmer* than the external atmosphere. This is perfectly natural; for with diminished sources of nourishment, they are exposed to an augmented perspiration, and the water which forms the larger portion of their bodies is lost. In fact, they fade from the volatilization of one of their component parts, which is an essential constituent of every *living* flower. The flowers of plants also feed on the viewless oxygen of the air, and form carbonic acid with great rapidity. Thus those of the *passiflora serratifolia* consume of oxygen in this way 18½ times their bulk in 24 hours, when sheltered from the direct rays of the sun, at a temperature between 18° and 25° C.; the male flowers of the cucumber, 12 times their bulk; the female only 3½; the single red gilliflower (*cheiranthus incanus*) 11; the single tuberose 9; and the *typha latifolia* 9·8. (T. de Saussure, Ann. de Chim. xxi. 279.) To supply in part the loss of moisture by evaporation, has arisen the universal practice of placing them in water; but the mutilated stems possess a far inferior power of sucking up fluids to that of the roots, and though their decay may thus be slightly impeded, yet, as the balance of *gain* on the one hand by the roots, and *loss* on the other hand by evaporation from their whole surface, cannot be maintained, they fade as a natural consequence. To preserve them, or at least to render their existence less ephemeral, we have therefore only to restore this balance—to surround them with a medium that will rob them of no water; or, in other words, to place them in a moist atmosphere. "It is now eighteen years ago since we first saw, in the drawing-room of a gentleman, in the hot dry weather of the dog-days, flowers preserved day after day in all their freshness by the following simple contrivance:—A flat dish of porcelain had water poured into it. In the water a vase of flowers was set; over the whole a bell-glass was placed with its rim in the water. This was a 'Ward's case' in principle, although different in its construction. The air that surrounded the flowers being confined beneath the bell-glass, was constantly moist with the water that rose into it in the form of vapor. As fast as the water was condensed, it ran down the sides of the bell-glass back into the dish; and if means had been taken to enclose the water on the outside of the bell-glass, so as to prevent its evaporating into the air of the sitting-room, the atmosphere around the flowers would have remained continually damp. The only difference between plants in a 'Ward's case' and flowers in the little apparatus just described is this—that the former is intended for plants to grow in for a considerable space of time, while the latter is merely for their preservation for a few days; and that the air which surrounds the flowers is always charged with the same quantity of vapor, and will not vary with the circumstances, and at the will of him who has the management of it. We recommend those who love to see plenty of fresh flowers in their sitting-rooms in dry weather, to procure it. The experiment can be tried by inverting a tumbler over a rose-bud in a saucer of water." (Gardener's Chronicle.)

Faded flowers may be generally restored by immersing them half-way up their stems in very *hot* water, and allowing them to remain in it until it cools, or they have recovered. They must then be removed, the '*coddled*' portion of the stems cut off, and placed in clean cold water. In this way a great number of faded flowers may be restored, but there are some of the more fugacious kinds on which it proves useless.

To hasten the blowing of flowers the following liquid has been used with great advantage:—Sulphate or nitrate of ammonia 4 oz.; nitrate of potash 2 oz.; sugar 1 oz.; hot water 1 pint; dissolve and keep it in a well-corked bottle. *For use*, put 8 or 10 drops of this liquid into the water of a hyacinth-glass or jar for bulbous-rooted plants, changing the water every 10 or 12 days. For flowering plants in *pots* a few drops must be added to the water employed to moisten them. The preference

should be given to *rain* water for this purpose. A similar fluid, sold by Mr. Potter under the name of "liquid guano," is an excellent article to promote the growth and early flowering of plants.

Flowers may be produced in winter by taking up the plants, trees, or shrubs in the spring, at the time when they are about to bud, with some of their own soil carefully preserved among the roots, placing them upright in a cellar till Michaelmas; when, with the addition of fresh earth, they are to be put into proper tubs or vessels, and placed in a stove or hothouse, where they must every morning be moistened or refreshed with rain-water, to which a little of the solution above mentioned has been added. Thus in the month of February, fruits or roses will appear, and with respect to flowers in general, if they are sown in pots, at or before Michaelmas, and watered in a similar manner, they will blow at Christmas.

Flowers for medicinal purposes should be gathered as soon as unfolded, and dried as speedily as possible, at a gentle heat, the calices, claws, &c., being previously taken off; when the flowers are small the calix may be left on, or even the whole flowering spike dried without mutilation. *Labiate flowers* are usually dried in the latter state. *Blue flowers*, as those of violets, bugloss, &c., should be dipped for a moment into boiling water, before drying them, to prevent their becoming yellow or discolored. The color of the petals of red roses is best preserved by quick drying, after which the yellow anthers may be removed by sifting. The odor of roses and pinks is improved by this treatment. *Compound flowers*, with pappous seeds, ought to be gathered before they are entirely opened, and should be dried very high, to prevent the moisture developing the pappi, which by keeping would unfit them for medical use.

The best method of drying flowers is to spread them thinly on paper trays and place them in a stove-room, or a current of dry air, (preferably the latter,) or in the sun. For odorless flowers the temperature may be between 75° and 120° F., observing, however, not to employ sufficient heat to destroy their color. For fragrant and aromatic flowers the heat should not exceed 75°. The flowering tops of plants, as those of lavender, wormwood, melilot, &c., are usually tied in small parcels or bundles, loosely wrapped in paper, and then hung up, that they may not get discolored or broken. The succulent petals of some plants, whose odor is very fugacious, as some of the liliaceous kinds, cannot be well dried, as their fragrance is lost, and at the same time they rot and become discolored. (See VEGETABLES.)

FLOWERS, ARTIFICIAL. The beauty and value of these pleasing imitations of the vegetable kingdom mainly depend upon the taste and ingenuity of the maker. The delicate fingers of woman and her ready powers of imitation and invention, combined with her natural affection for the floral world, and her ready perception of the true and beautiful in nature and art, have enabled her especially to excel in this manufacture. At the present time, this art is carried to the greatest perfection by the female artificial florists of the French capital.

The French employ velvet, kid, and fine cambric for the petals, and taffeta for the leaves. Very recently thin plates of bleached whalebone have been used with great success for some portions of artificial flowers.

As *colors and stains*, the following are employed in Paris:—*Red*, carmine dissolved in a solution of salts of tartar, or in spirits of hartshorn; *yellow*, tincture of turmeric; *green*, a solution of distilled verdigris; *blue*, indigo dissolved in oil of vitriol, and the acid partly neutralized with salt of tartar or whiting; *violet*, liquid archil, mixed with a little salts of tartar; *lilac*, liquid archil. These colors are usually applied to the petals with the finger.

FLOWERS, (IN CHEMISTRY.) Pulverulent or flower-like substances obtained by sublimation, as flowers of benzoin, zinc, sulphur, &c. The term has been discarded from modern chemical nomenclature, but is still commonly employed in familiar language.

FLOWERS OF CALOMEL. Calomel resublimed from a retort, with a very short, wide neck, kept too hot for it to condense on, into a receiver half filled with water, and sufficiently hot to steam. A fine white powder, possessing the same properties as ordinary calomel.

FLOWERS OF ZINC. *Syn.* FLORES ZINCI. ZINCUM CALCINATUM. ZINCI OXIDUM. (P. L. before 1824.) Oxide of zinc obtained by the rapid combustion of metallic zinc in a deep crucible, placed sideways in a furnace, so that the flowers may be collected as they form. Antispasmodic. *Dose.* 5 to 10 grs. in epilepsy, &c. Also used as a white pigment, but dries badly.

FLUID, ETCHING. I. (For copper.) *Prep* *a.* Aquafortis 2 oz.; water 5 oz.; mix.

b. To the last add verdigris 1 oz., and water 3 oz.; dissolve.

c. Verdigris, common salt, and sal ammoniac, of each 4 oz.; alum 1 oz., (all in powder;) strong vinegar 8 oz.; water 1 lb.; dissolve by boiling for a moment, cool, and decant the clear. This is the *eau forte* of Callot and Piranesi.

II. (For steel.) *a.* Iodine 1 oz.; iron filings ½ dr.; water 4 oz.; mix and dissolve.

b. Pyroligneous acid 4 oz.; alcohol 1 oz.; mix and add nitric acid 1 oz.; all by measure. This menstruum was employed and recommended by Mr. Turrel. For the method of using the above fluids, see ETCHING.

FLUID MAGNESIA. *Prep.* Place recently precipitated carbonate of magnesia in a bottle or other suitable vessel, and fill it by means of a soda-water apparatus with water fully charged with carbonic acid gas. With slight and cautious agitation the aerated water will become saturated with magnesia. A scruple of carbonate of magnesia put into a bottle, and thus treated, will be all taken up in from 20 minutes to half an hour, and the beverage left beautifully clear. (Geo. Raistrick. Chem. v. 42.)

FLUMMERY, (IN COOKERY.) A species of thick hasty-pudding, made with oatmeal or rice, flavored with milk, cream, almonds, orange-flowers, lemons, &c., according to fancy. *French flummery* is made with equal parts of blanc-mange and cream, sweetened and flavored. *Dutch flummery* is blanc-mange and eggs, flavored with lemon and sweetened. All these are poured into forms and served cold, to eat with wine, spirits, cider, &c.

FLUOBORATES. *Syn.* FLUOBORIDES BOROFLUORIDES. HYDROFLUORBORATES. Compounds of fluoboric acid, with the salifiable bases. See the next article.

FLUOBORIC ACID. *Syn.* TERFLUORIDE OF BORON. A peculiar gaseous compound of fluorine and boron, discovered by Gay Lussac and Thénard.

Prep. Vitrified boracic acid 1 part; fluor spar 2 parts; mix, and expose the mixture to heat in a leaden retort. A colorless gas is evolved, which is rapidly absorbed by water, forming liquid fluoboric acid, (Gay Lussac, Thénard, Dr. Davy,) or boro-hydrofluoric acid, (Berzelius.) It does not attack glass, but rapidly destroys organic substances. Water absorbs 700 times its volume of this gas. (Davy.) See BOROFLUORIDE OF HYDROGEN.

FLUORIDES. Compounds of fluorine with the metals. (See FLUORINE.)

FLUORIDES OF CHROMIUM. I. (*Sesquifluoride.*) *Prep.* Dissolve hydrated oxide of chromium in hydrofluoric acid and evaporate. A crystalline green mass.

II. (*Perfluoride. Fluochromic Acid.*) Fluor spar 3 parts; chromate of lead 4 parts; fuming (or the strongest) sulphuric acid 5 parts; mix cautiously in a silver or leaden retort. A red colored gas is evolved, which acts rapidly on gas, forming fluosilicic acid gas, and upon water, forming hydrofluoric acid and chromic acid. The moisture of the atmosphere is sufficient to effect this decomposition, the former substance escaping under the form of gas, and the latter being deposited in small crystals. (See CHROMIC ACID.)

FLUORINE. The electro-negative elements of hydrofluoric acid and the fluorides. This substance, though long known in combination, has only been lately obtained in a separate state. The honor of having first obtained it in an insulated form is due to Baudrimont, who procured it by passing fluoride of boron over minium heated to redness, and receiving the gas in a dry vessel. As thus obtained, it is not absolutely pure, being contaminated with small quantities of hydrofluoric and silico-fluoric acids. It has a yellowish color, and an odor between that of chlorine and burnt sugar. In this state it does not act on glass, but combines directly with gold. With hydrogen it forms *hydrofluoric acid*, and with the metals *fluorides.* The word *fluorine* was given to this substance from its existing in fluor or Derbyshire spar. The adjectitious term fluor, (from *fluo*, I flow,) was applied to this spar or mineral from its ready fusibility, and being sometimes used as a flux to promote the fusion of certain refractory minerals.

FLUOSILICIC ACID. *Prep.* Powdered fluor spar and silicious sand, or powdered glass, 1 part; concentrated sulphuric acid 2 parts; mix in a glass retort, apply a gentle heat, and collect the evolved gas over mercury.

Remarks. A colorless incombustible gas, highly corrosive, and poisonous, but does not act on glass vessels, when they are quite dry. Water absorbs 365 times its volume of this gas, (Dr. Davy;) but decomposition ensues, *pure hydrated silicic acid* being deposited in a gelatinous state, and a solution of hydrofluoric acid, containing only two-thirds of the silicic acid originally present in the gas, being formed. (Berzelius.) This solution is called *silicated fluoric acid*, or *silico-hydrofluoric* acid. It is acid and corrosive. By the action of water of ammonia fluosilicic acid gas is completely decomposed, depositing its silica. In this way Dr. Davy obtained $\frac{614}{1000}$ of its weight of the latter substance.

FLUX. *Syn.* FLUSS, (*Ger.*) FLUX, (*Fr.*) FLUOR (*Lat.*, from *fluo*, I flow.) In PATHOLOGY, this term is occasionally applied to diarrhœa, cholera, and dysentery, but is nearly obsolete. In CHEMISTRY, fluxes are substances of easy fusibility, which are added to others more refractory, to promote their fusion. The principal fluxes are the following:—

1. (*Black flux.*) Cream of tartar 2 parts; nitre 1 part; powder, mix, and deflagrate, by small quantities at a time, in a red hot crucible. This is merely carbonate of potash, mixed with charcoal in a finely-divided state. It is used for smelting metallic ores, and exercises a reducing action, as well as promoting the fusion.

2. (*White flux. Cornish refining flux.*) Cream of tartar and nitre, equal parts; deflagrate as last.

3. (*Morveau's reducing flux.*) Powdered glass (containing no lead) 1 lb.; calcined borax 2 oz.; powdered charcoal 1 oz.; mix. Used for the same purposes as black flux.

4. (*Cornish reducing flux.*) Cream of tartar 10 oz.; nitre 4 oz.; borax 3 oz.; mix.

5. (*Crude flux.*) Nitre mixed with twice its weight of tartar, without deflagration. Reducing.

6. Borax, tartar, nitre, sal ammoniac, common salt, limestone, glass, fluor spar, and several other substances are used as fluxes in metallurgy.

Remarks. On the large scale crude tartar is employed.

FOILS. (From *feuille, Fr.*, or *folium, Lat.*, a leaf.) Thin leaves of polished metal, put under stones or pastes, to heighten the effect. Foils were formerly made of copper, tinned copper, tin, and silvered copper, but the latter is that wholly used for superior work at the present day. There are two descriptions of foils employed, viz., *white*, for diamonds and mock diamonds, and *colored*, for the colored gems. The latter are prepared by varnishing the former. By their judicious use the color of a stone may be often modified. Thus, by placing a yellow foil under a green stone that turns too much on the blue, or a red one turning too much on the crimson, the hues will be brightened.

Prep. I. (*White or common foil.*) This is made by coating a plate of copper with a layer of silver, and then rolling it into sheets in the flatting mill. The foil is then highly polished or varnished.

II. (*Colored foils.*) These are made by coloring the preceding foil, highly polished, with certain transparent solutions or varnishes. The following produce beautiful colored effects, when judiciously employed:—

a. (*Blue.*) Prussian blue, (preferably Turnbull's,) ground with pale, quick-drying oil. Used to deepen the color of sapphires. It may be diluted with oil.

b. (*Green.*) 1. Pale shellac, dissolved in alcohol, (lacker,) and tinged green by dissolving verdigris or acetate of copper in it. 2. "Sesquiferrocyanuret of iron" and bichromate of potassa, of each ½ oz.; grind them with a stone and muller to

a fine powder, add gum mastich (clean and also in fine powder) 2 oz.; grind again, add a little pyroxilic spirit, and again grind until the mass becomes homogeneous and of a fine transparent green; the beauty increases with the length of the grinding. The predominance of the bichromate turns it on the yellowish green; that of the salt of iron, on the bluish green. For use it is to be thinned with pyroxilic spirit." (Chemist, iii. 238.) This is used for emeralds. It may be brightened by adding a little yellow varnish.

c. (*Yellow.*) 1. Various shades of yellow may be produced by tinging a weak alcoholic solution of shellac or mastich, by digesting *turmeric, annatto, saffron,* or *socotrine aloes* therein. The former is the brightest and most fit for topazes. 2. Digest hay saffron in 5 or 6 times its weight of boiling water, until the latter becomes sufficiently colored, filter, and add a little solution of gum or isinglass. When dry, a coating of spirit varnish should be applied.

d. (*Red.*) Carmine dissolved in spirits of hartshorn, or a weak solution of salt of tartar, and gum added as above.

e. (*Garnet.*) Dragon's blood dissolved in rectified spirit of wine.

f. (*Vinegar garnet.*) Orange lake finely tempered with shellac varnish.

g. (*Amethyst.*) Lake and prussian blue, finely ground in pale drying oil.

h. (*Eagle marine.*) Verdigris tempered in shellac varnish, (alcoholic,) with a little prussian blue.

i. (*Ruby.*) 1. Lake or carmine, ground in isinglass. 2. Lake ground in shellac varnish. Used when the color turns on the purple. 3. Bright lake ground in oil; used when the color turns on the scarlet or orange.

k. (*Diamond.*) 1. Cover the inside of the socket in which the stone or paste is to be set with tin foil, by means of a little stiff gum or size; when dry, polish the surface, heat the socket, fill it with warm quicksilver, let it rest for two or three minutes, then pour it out and gently fit in the stone; lastly, well close the work round the stone, to prevent the alloy being shaken out. 2. Coat the bottom of the stone with a film of real silver, by precipitating it from a solution of the nitrate in spirits of ammonia, by means of the oils of cassia and cloves. (See SILVERING.) Both these methods vastly increase the brilliancy both of real and factitious gems.

Remarks. By the skilful use of the above varnishes, good imitations of the gems may be cheaply made from transparent white glass or paste, and when applied to foils set under colored pastes, (factitious gems,) a superior effect may be produced. The colors must be reduced to the finest state possible by *patient grinding*, as without this precaution, transparent and beautiful shades cannot be formed. The palest and cleanest mastich, and lac dissolved in alcohol, and also the palest and quickest drying oil should alone be employed, when these substances are ordered. In every case the colors must be laid on the foils with a broad soft brush, and the operation should be performed, if possible, at once, as no part should be *crossed*, or twice gone over while wet. If the color be not deep enough, a second coat may be given when the first one has become *quite* dry, but this practice is not to be recommended.

FOMENTATION. *Syn.* FOMENTUM, FOMENTATIO, FOTUS, (*Lat.*) FOMENTATION, (*Fr.*) I. Local bathing, with heated water, simple or medicated.

II. The liquid used for the above purpose. Fomentations are chiefly employed to allay pain and irritation, and to promote suppuration and the healthy action of the parts.

FOMENTATION. *Syn.* COMMON FOMENTATION. FOTUS COMMUNIS, (P. L. 1746.) Compound decoction of mallows.

FOMENTATION, ANODYNE. *Syn.* FOTUS ANODYNUS. *Prep.* (E. H.) Poppies 1 oz.; elder flowers ½ oz.; water 2½ pints; boil to 1½ pints. To relieve pain.

FOMENTATION, ANTISEPTIC. *Syn.* FOTUS ANTISEPTICUS. *Prep.* (Ger. H.) Decoction of bark lb. ij; infusion of chamomile lb. j; spirits of camphor f℥ij; muriatic acid f℈j; mix.

FOMENTATION, AROMATIC. *Syn.* FOTUS AROMATICUS. *Prep.* Sea wormwood, abrotanum and chamomiles, of each 1 oz.; laurel leaves ½ oz.; water 5 pints; boil to ½ gallon.

FOMENTATION, ASTRINGENT. *Syn.* FOTUS ASTRINGENS. F. ROBORANS. *Prep.* (P. H.) Bistort and pomegranate peel, of each 2 oz.; sal ammoniac ½ oz.; red wine 1 pint; infuse at a gentle heat.

FOMENTATION FOR WORMS. *Syn.* FOTUS ANTHELMINTICUS. *Prep.* (P. Cod.) Leaves and flowers of tansy, wormwood, and chamomile, of each ℥iij; water lb. iij; boil to lb. ij.

FOMENTATION OF DIGITALIS. *Syn.* FOMENTUM DIGITALIS. *Prep.* (Guy's H.) Leaves of deadly nightshade, ℥j; boiling water lb. ij; infuse.

FOMENTATION OF HEMLOCK. *Syn.* FOMENTUM CICUTÆ. F. CONII. *Prep.* (St. B. H.) Fresh hemlock leaves, ℥ij; (or dried leaves, ℥j;) water 1½ pints; boil to a pint.

FOMENTATION OF ELDER FLOWERS. *Syn.* FOTUS SAMBUCI. *Prep.* (P. Cod.) Elder flowers ℥iij; boiling water 1 quart; macerate 1 hour.

FOMENTATION OF SAL AMMONIAC. *Syn.* FOMENTUM AMMONIÆ MURIATIS. *Prep.* (P. C.) Compound decoction of mallows ℥xxxij; sal ammoniac ℥j; dissolve, and add spirit of camphor ℥ij.

FOMENTATION, RESOLVENT. *Syn.* FOTUS RESOLVENS. *Prep.* (Richard.) Fomentation of elder flowers ℥viij; liquor of diacetate of lead ℨss; mix.

FOMENTATION, VINOUS. *Syn.* FOTUS VINOSUS. *Prep.* (P. Cod.) Red wine 1 quart; honey ℥ivss; dissolve.

FORCEMEAT. *Syn.* FARCE. (In COOKERY.) A species of sausage meat, either served up alone, or employed as an ingredient in other dishes Our notice of this article must be confined to the following extracts from a popular System of Cookery:—

"According to what it is wanted for should be the selection from the following list, observing that of the most pungent articles, least must be used No one flavor should predominate greatly; yet if several dishes be served the same day, there should

be a marked variety in the tastes of the forcemeats, as well as of the gravies. A general fault is, that the tastes of lemon-peel and thyme overcome all others; therefore they should only be used in small quantities. They should be consistent enough to cut with a knife, but not dry and heavy. Herbs are a very essential ingredient; and it is the copious and judicious use of them that chiefly gives the cookery of the French its superior flavor. To *force* fowls, meat, &c., is to stuff them." (Mrs. Rundel.)

"*Forcemeat ingredients.* Cold fowl, veal, or mutton; scraped ham or gammon; fat bacon, or the fat of ham; beef-suet; veal-suet; butter; marrow; crumbs of bread; parsley; white pepper; salt; nutmeg; yelk and white of eggs, well beaten to bind the mixture.

"Cold sole; oysters; anchovy; lobsters; tarragon; savory; pennyroyal; knotted marjoram; thyme and lemon-thyme; basil; sage; lemon-peel; yelks of hard eggs; mace and cloves; cayenne; garlic; shalot; onion; chives; chervil; Jamaica pepper in fine powder, or two or three cloves."

The first paragraph contains the articles of which the forcemeat may be made, without any striking flavor; and to these may be added some of the different ingredients in the second paragraph, to vary the taste.

I. (*For fowls or meat.*) Shred a little ham or gammon, some cold veal or fowl, some beef-suet, a small quantity of onion, some parsley, very little lemon-peel, salt, nutmeg, or pounded mace, and either white pepper or cayenne, and bread-crumbs: pound it in a mortar, and bind it with one or two eggs, beaten or strained. For forcemeat patties, the mixture as above.

II. (*For hare, or any thing in imitation of it.*) The scalded liver, an anchovy, some fat bacon, a little suet, some parsley, thyme, knotted marjoram, a little shalot, and either onion or chives, all chopped fine; crumbs of bread, pepper, and nutmeg, beat in a mortar with an egg.

III. (*For fish soups, or fish stewed on maigre days.*) Beat the flesh and soft parts of a middling lobster, half an anchovy, a large piece of boiled celery, the yelk of a hard egg, a little cayenne, mace, salt, and white pepper, with two table-spoonfuls of bread-crumbs, one ditto of oyster liquor, two ounces of butter, warmed, and two eggs long beaten: make into balls, and fry of a fine brown in butter.

IV. (*For fish.*) Chop, and afterwards pound in a mortar, any kind of fish, adding an anchovy or two, or a teaspoonful of the essence of anchovies, (but do not allow the taste to prevail,) and the yelk of a hard-boiled egg: if for the maigre, pound butter with it; but otherwise, the fat of bacon pounded separately, and then mixed: add a third portion of bread, prepared by previously pounding and soaking, and mix the whole up with raw eggs.

V. (*Common veal-stuffing.*) Take equal quantities of beef-suet and crumbs of bread, chop the suet very finely: chop together a bundle of sweet herbs; add to them a tea or salt spoonful of grated lemon-peel, and pepper and salt. Ude, who is good authority, observes that "it would not be amiss to add a piece of butter, and pound the whole in a mortar;" mix it up with eggs.

Obs. Grated ham or tongue may be added to this stuffing.

By mixing with any potted meat or game an equal proportion of soaked bread, (which will always be lighter than bread-crumbs,) the cook will have at once a very fine species of farce, to be employed in stuffing olives, fillets of fowl, &c. Bacon or butter must always be substituted for suet when the forcemeat is to be eaten cold.

At many tables, where every thing else is well done, it is common to find very bad stuffing.

FORMIC ACID. (From *Formica*, an ant.) The sour liquid ejected by ants when irritated. It was formerly solely obtained from these insects by distilling them along with water. This acid was discovered by Gehlen, but first prepared artificially by Doebereiner.

Prep. I. (Doebereiner.) Tartaric acid 2 parts; peroxide of manganese and concentrated sulphuric acid, of each 3 parts; water 5 parts; distil in a capacious retort into a well-cooled receiver.

II. (Ure.) Tartaric acid 10 parts; concentrated sulphuric acid 15 parts; black oxide of manganese 14 parts; water 20 to 30 parts; distil as last.

III. (Mr. C. Watt, jun.) Coal naphtha (or pyroxilic spirit) 1 part; bichromate of potassa and sulphuric acid, of each 3 parts; place the naphtha in a flask fitted with a funnel tube; the bichromate of potassa is then to be added, and the sulphuric acid, diluted with an equal weight of water, gradually poured down the funnel; while the acid is being added, heat is to be applied, when the formic acid will distil over, and may be condensed in a vessel kept cool. A portion of naphtha will distil over with the formic acid, which may be again treated with bichromate of potassa and sulphuric acid, when a fresh portion of formic acid will be produced. If this acid be required perfectly pure, it must be saturated with pure carbonate of soda or potassa, and subjected to a gentle heat to volatilize any small portion of naphtha with which it may be contaminated. The formic acid is then to be liberated from the salt by means of dilute sulphuric acid, and subjected to distillation, when the acid will be obtained perfectly pure. This process yields a large product. (Chemist, iii. 233.)

IV. (Liebig.) *a.* Starch 1 part; peroxide of manganese, in fine powder, 4 parts; water 4 parts; mix in an alembic, or retort; heat to 104° F.; then add 4 parts of oil of vitriol, by degrees, and after the frothing is over, apply heat and distil off 4½ parts of liquid. The retort should have a capacity equal to 10 times the bulk of the ingredients.

b. (*On the small scale.*) Starch 10 parts; peroxide of manganese 37 parts; oil of vitriol and water, of each, 30 parts; as last. *Product.* 3·35 parts of an acid capable of neutralizing 15⅝ of dry carbonate of soda.

c. (*Pure hydrated formic acid.*) I. Introduce formiate of lead, in fine powder, into a long glass tube, connect one end with an apparatus evolving sulphureted hydrogen, and the other with a receiver. When the salt is entirely decomposed (blackened) apply *a very gentle* heat, and collect the distilled liquid; lastly, boil the product for a minute or less, to expel any adhering sulphureted gas. This hydrate contains 1 atom or 20⅜ of water. 2. Dry formiate of lead, 18 parts; oil of vitriol 6 parts; water 1 part; distil in a muriate of

lime bath. This hydrate contains 2 atoms of water.

d. Formiate of lime 10 parts; oil of vitriol 8 parts; water 4 parts; distil. *Product.* Nine parts of pure but dilute acid; sp. gr. 1·075.

Remarks. The processes *c.* 1 and 2, yield perfectly pure hydrated formic acid, the others, mere solutions of this acid in water. They are all limpid and colorless. The first hydrate (IV, *c*,) boils at 212°, crystallizes in brilliant scales below 32°, and has the sp. gr. 1·2353. The second hydrate (IV, *c*, 2,) boils at 223°, does not solidify at —5°, and has the sp. gr. 1·11. Both the above are extremely corrosive, and rapidly destroy the texture of living organic substances. The products of the other processes are very dilute.

Formic acid reduces the salts of mercury and silver, and forms salts with the bases termed *formiates.* Most of these may be formed by either saturating the acid with the hydrate, carbonate, or oxide of the base, or by double decomposition, by adding a solution of a soluble salt of the base to another of an alkaline formiate. They are all soluble in water.

FORMIC ETHER. *Syn.* FORMIATE OF OXIDE OF ETHULE. *Prep.* Dry formiate of soda 7 parts; oil of vitriol 10 parts; alcohol of 90§, 6 parts; mix in a retort connected with a well-cooled receiver. The greater part will distil over by the heat spontaneously developed. Purify by agitation, first with milk of lime, and afterwards with chloride of calcium. It is limpid, smells aromatic, is lighter than water, soluble in 10 parts of that fluid, and boils at 128° F. (See ETHER, AND ETHERS, ORGANIC.)

FORMO-BENZOIC ACID. *Syn.* FORMIATE OF HYDRURET OF BENZULE. A peculiar acid discovered by Winkler, and obtained by dissolving oil of bitter almonds in water, adding muriatic acid, evaporating, and treating the dry mass with ether, which dissolves out the new acid: it may be decolored by animal charcoal, and obtained in crystals by evaporation. It readily combines with the bases, forming salts called *formobenzoates.*

FORMOMETHYLAL. *Syn.* FORMIATE OF METHULE, (*tribasic.*) A very volatile liquid, obtained by Kane, by distilling a mixture of 2 parts each of pyroxilic spirit and peroxide of manganese, and 3 parts each of oil of vitriol and water. Several products first distil over, and after the boiling point of the distilled liquor reaches 177°, the formiate of methule begins to collect in the receiver.

FORMULE. A hypothetical organic radical, supposed to consist of 2 eq. of carbon and 1 eq. of hydrogen, of which formic acid is the oxide. Its existence is inferred from the constitution of certain known compounds. (Liebig.) Iodide, bromide, chloride, and sulphuret of formule, have been obtained, but are only interesting in a scientific point of view.

FOXING. The spontaneous souring of worts or beer during fermentation or ripening. It is generally occasioned by want of proper attention or skill on the part of the brewer. (See BREWING.)

FRAXININE. A peculiar, soluble, bitter, neutral, and crystallizable substance, extracted from the bark of fraxinus excelsior.

FRECKLES may be removed by the frequent application of *dilute* spirits, acids, or alkaline solutions; the latter two just strong enough to prick the tongue. (See COSMETICS.)

FREEMAN'S BATHING SPIRITS. Opodeldoc, colored with Daffy's elixir.

FREEZING. *Syn.* CONGELATION, (*Fr.*) CONGELATIO, (*Lat.*) GEFRIERUNG, (*Ger.*). The conversion of a liquid into the solid state, by the abstraction of a portion of its caloric. (See CONGELATION.)

FRENCH BERRIES. *Syn.* PERSIAN BERRIES. AVIGNON DO. GRAINES D'AVIGNON. The berries or fruit of the rhamnus infectorius. They are imported from France and Persia; those from the latter country being esteemed the best. Their decoction dyes cloth, mordanted with alum, tartar, or protomuriate of tin, of a yellow color; with sulphate of copper, an olive, and with red sulphate of iron, an olive-green color.

FRENCH POLISH. *Prep.* I. A solution of shellac in wood naphtha, (pyroxilic spirit.)

II. Pale shellac 3 lbs.; mastich 6 oz.; alcohol of 90§, 3 quarts.

III. Shellac 2 lbs.; mastich and sandaric, (both in powder,) of each 1 oz.; copal varnish 12 oz.; alcohol 1 gallon.

Remarks. All the above are made in the cold by frequently stirring or shaking the ingredients together in a well-closed bottle or other vessel. French polish is used without filtering. (See the next article.)

FRENCH POLISH, (TO.) The varnish being prepared, (shellac,) the article to be polished being finished off as smoothly as possible with glass paper, and your rubber being made as directed below, proceed to the operation as follows:—The varnish, in a narrow-necked bottle, is to be applied to the *middle* of the flat face of the rubber, by laying the rubber on the mouth of the bottle and shaking up the varnish once, as by this means the rubber will imbibe the proper quantity to varnish a considerable extent of surface. The rubber is then to be enclosed in a soft linen cloth, doubled, the rest of the cloth being gathered up at the back of the rubber to form a handle. Moisten the face of the linen with a little *raw* linseed oil, applied with the finger to the middle of it. Place your work opposite the light, pass your rubber *quickly* and *lightly* over its surface until the varnish becomes dry, or nearly so; again charge your rubber as before with varnish, (omitting the oil,) and repeat the rubbing, until three coats are laid on, when a little oil may be applied to the rubber, and two coats more given to it. Proceed in this way until the varnish has acquired some thickness; then wet the *inside* of the linen cloth, before applying the varnish, with alcohol, or wood naphtha, and rub quickly, lightly, and uniformly the whole surface. Lastly, wet the linen cloth with a little oil and alcohol without varnish, and rub as before till dry.

To make the rubber, roll up a strip of *thick* woollen cloth which has been torn off, so as to form a soft elastic edge. It should form a coil, from 1 to 3 inches in diameter, according to the size of the work

FRICTION. (From *frico,* I rub.) In MECHANICS, the resistance produced by the rubbing together of the surfaces of solid bodies. The amount of friction is proportionate to the rough-

in gilding by artists and gilders, and by druggists to gild pills, &c.

GOLD, LIQUID. *Syn.* POTABLE GOLD. AURUM POTABILE. *Prep.* Agitate ether with a solution of terchloride of gold for some time, allow it to repose, and decant the supernatant portion.

Remarks. Naphtha and essential oils possess the same property as ether of taking gold from its solutions. This liquid was formerly held in great esteem as a cordial medicine. It is now only employed for writing on steel, gilding, &c. As it dries, it leaves a coating of pure gold.

GOLD, OXIDES OF. *Prep.* I. (*Protoxide of gold.*) Precipitate a solution of terchloride of gold with a cold solution of pure potassa. A green powder, partially soluble in liquor of potassa, and spontaneously changing into metallic gold and peroxide of gold.

II. (*Binoxide of gold.*) This is supposed to be the purple powder formed by the combustion of gold.

III. (*Peroxide of gold. Oxide of do. Teroxide of do. Auric acid. Auri oxydum. Auri teroxydum. Crocus of gold. Crocus solis.*) *a.* (P. Cod.) Calcined magnesia 4 parts; terchloride of gold 1 part; water 40 parts; mix, boil; wash the precipitate first with water, next with dilute nitric acid, and lastly again with water. Dry in the shade.

β. (*Pesth.*) Neutral chloride of gold, containing 1 part of gold; water 12 parts; carbonate of potassa 1 part, dissolved in water 2 parts; digest at 170°, well wash the precipitate with water, dissolve in colorless nitric acid sp. gr. 1·400, and decompose the solution by admixture with water. The precipitate is the *pure hydrated peroxide of gold;* it may be rendered anhydrous by drying it at a heat of 212°. (Liebig.)

Remarks. In the state of hydrate, teroxide of gold is yellow, but dark-brown or black, when free from water. It is insoluble in water, and completely decomposed by solar light and a red heat. It dissolves in muriatic acid, forming terchloride of gold, and also in some of the oxygen acids, but is again precipitated on the addition of water. It unites with the alkalis and earths forming salts, which have been termed *aurates,* from the oxide playing the part of an *acid* in their composition. *It has been given as a medicine* in scrofula, &c., in doses of one-tenth to 1 gr., made into a pill with extract of mezereon.

GOLD POWDER. *Syn.* PULVIS AURI. AURUM PULVERATUM. *Prep.* (P. Cod.) Triturate leaf gold with sulphate of potassa, (in crystals,) and wash out the latter with boiling water. Used in medicine, painting, gilding, &c. (See GILDING POWDER.)

GOLD, RING. *Prep.* I. Spanish copper 6½ pennyweights; fine silver 3½ do.; gold coin 29 do.; fuse together. Worth about 3*l.* per oz.

II. Spanish copper 8 oz. 8 pennyweights; fine silver 10 pts.; gold coin 1 oz.; fuse. Worth 35*s.* to 40*s.* an ounce.

GOLD, SODA-CHLORIDE OF. *Syn.* SODA MURIATE OF GOLD. CHLORIDE OF GOLD and SODA. AURO-TERCHLORIDE OF SODIUM. SODII AURO-CHLORIDUM. SODII AURO-TERCHLORIDUM. AURI ET SODII CHLORURETUM. AURUM MURIATICUM NATRONATUM. *Prep.* (P. Cod.) Terchloride of gold 85 parts; chloride of sodium 16 parts; dissolve in a *little* distilled water, evaporate till a pellicle forms, then put it aside to crystallize. *Dose.* One-twentieth to one-tenth gr., made into a pill with starch or lycopodium, in the same cases in which the terchloride is ordered. Mixed with 2 or 3 times its weight of orris powder, it is used in frictions on the tongue and gums; and an *ointment* is made with 1 gr. mixed with 36 grs. of lard The latter is applied to the skin, deprived of the epidermis by a blister.

GOLD SOLDER. *Prep.* Pure gold 12 pennyweights; silver 2 do.; copper 4 do.; fuse together. Used by jewellers to solder gold.

GOLD, SULPHURET OF. *Prep.* Transmit a current of sulphureted hydrogen gas through a solution of chloride of gold in water; or add a solution of hydro-sulphuret of ammonia to the same solution; collect the precipitate, wash with cold distilled water, and dry in the shade.

GOOSEBERRIES. Ripe gooseberries are wholesome, but the skins and seeds should not be eaten, as they are very indigestible. They may be preserved by bottling. (See FRUIT.)

GOOSEBERRY CHEESE. *Prep.* Gather the rough red gooseberries when quite ripe; bake them until they are a perfect mash; pass them through a hair-sieve, then put them into a preserving-pan, and boil them gently. To every pound of gooseberries put three ounces of sugar, which should be strewed in every now and then, a little at a time. It will take several hours to boil, in order to obtain the proper thickness.

GOOSEBERRY FOOL. *Prep.* Put the fruit into a stone jar, with some good Lisbon sugar; set the jar on a stove, or in a saucepan of water over the fire; if the former, a large spoonful of water should be added to the fruit. When it is done enough to pulp, press it through a colander: have ready a sufficient quantity of new milk, and a teacupful of raw cream boiled together, or an egg instead of the latter, and leave it to cool: then sweeten pretty well with fine Lisbon sugar, added to the pulp by degrees.

GOOSE GREASE. *Syn.* ADEPS ANSERIS. From roasted goose. Yellowish white, strong scented, emollient, used in clysters, and when *scented,* as a pommade to make the hair grow, for which purpose it is *said* to be superior to *bear's grease.* In quantity it is an emetic of very easy action.

GOUT. (From *goute, Fr.*—the origin of which is uncertain. Dr. GOOD.) A painful disease that chiefly attacks the male sex, particularly those of a corpulent habit and robust frame. Persons who live temperately and take much exercise are seldom troubled with gout. Indolence, inactivity, luxurious habits of life, and free living, are the chief exciting causes of this disease, but excessive study, grief, watchfulness, exposure to cold, and the too free use of acidulous liquors, also occasionally bring it on. In some persons, gout is an hereditary disease.

Symp. Gout is generally preceded by unusual chilliness of the feet and legs, and a numbness, or a sensation of prickling along the lower extremities; the appetite fails, flatulency, indigestion, torpor, and languor ensue, and extreme lassitude and fatigue follow the least bodily exercise; the

bowels become costive and the urine pallid. The fits usually come on in the night; the patient is awaked by the severity of the pain, generally in the first joint of the great toe, or occasionally in the heel, whole foot, or calf of the leg. The pain resembles that of a dislocated joint, accompanied by a sensation resembling the affusion of cold water; the pain increases, rigors and febrile symptoms ensue, accompanied with local throbbing and inflammation. Sometimes both feet or legs are attacked; at others, only one. Towards morning the patient generally falls asleep, and sinks into a state of copious perspiration, from which he awakes comparatively recovered. This constitutes what is called a *fit of gout*. These fits or paroxysms are apt to return at intervals, commonly every evening, with more or less violence, and when frequent, the disease usually extends its action, the joints become affected, and concretions of a chalky nature (gout-stones) are formed upon them, and they become stiff and nearly immoveable.

Treat. A plain or vegetable diet, moderate exercise, and the use of warm laxatives, gentle tonics, diaphoretics, and diuretics, are among the best preventives. The moderate use of alkaline remedies has also been recommended. To remove the *fit of gout*, or to check it at its commencement, the affusion of cold water will be usually found effective. The use of the EAU MEDICINALE, or the VINUM COLCHICI of the Pharmacopœia, should also be had recourse to; a due dose of which taken at bedtime will frequently carry off the paroxysm, and nearly always mitigate the symptoms. The effects of the above remedies do not greatly differ from each other; for "after taking about 60 drops of either, the pulse becomes slower, and at length sinks in about 12 hours, from 10 to 20 strokes per minute below its natural number, at which time the inflammation subsides. The action of both medicines is accompanied with great languor, and a deadly nausea or sickness, which terminates in vomiting or a discharge from the bowels, or both." These symptoms have often reached an alarming extent, and in some constitutions follow even a moderate dose. This method of cure should not therefore be unadvisedly and incautiously adopted. It must, however, be confessed, that colchicum properly administered, will almost always alleviate the symptoms, and lessen the frequency of the attacks; and numerous instances are on record, where the inroads on the constitution were increasing to an alarming extent, and that at an advanced period of life, in which colchicum, carefully administered, seems at least to have lessened the severity of the disease, if not to have been the active agent in its removal. (See COLCHICUM, EAU MEDICINALE, &c.)

GOUT PILLS, LARTIGUES. *Prep.* Compound extract of colocynth 20 gr.; alcoholic extract of colchicum seeds, and alcoholic extract of digitalis, of each 1 gr.; mix and divide into pills weighing 15 centigrammes each. The compound extract of colocynth used above, is to be made as follows:—Pulp of colocynth 185 grammes; extract of aloes 370 do.; bruised scammony 125 do.; cardamom seeds 30 do.; hard soap 90 do.; spirit, at 25° or sp. gr. ·906, 4 quarts; macerate the colocynth in the spirit for 3 days, strain, add the aloes, scammony, and soap, evaporate to a proper consistence, then add the cardamoms in fine powder. (Bouchardat.)

GOUTTES AMERES, (*Fr.*) BITTER DROPS. *Prep.* Nux vomica, rasped, lb. j; liquor of potassa ℥ss; bistre ʒj; compound spirit of wormwood ℥xxxij; digest for 10 days. Stomachic. *Dose.* 1 to 8 drops in water, or any bitter infusion.

GRAINS OF PARADISE. *Syn.* GUINEA GRAINS. MALAGUETTA PEPPER. The seeds of the amomum grana-paradisi. Grains of paradise possess similar aromatic properties to the other peppers. In some parts of the world they are used as a condiment. They are principally employed in England to impart a false strength to wine, beer, spirits, and vinegar. There is a penalty of 200*l.* on the brewer for using them, and 500*l.* on any druggist who sells them to a brewer.

GRANADINE. *Syn.* GRENADINE. A sweet substance found by Latour de Trie in the bark of the pomegranate root. It has since been shown to be *mannite*.

GRANULATION. The reduction of metals into grains or drops. This is done by pouring them, in the melted state, into water. In many cases they are allowed to run through the holes of a species of colander or sieve, to produce minute division; and in order to render the drops spherical, they are allowed to fall from a sufficient height to permit of their acquiring the solid state before striking the water. Lead shot is granulated in this way. Shot towers are often upwards of 100 feet in height.

GRAPE SUGAR. Obtained from the juice of grapes by saturating the acid with chalk, decanting the clear liquid, evaporating to a sirup, clarifying with white of egg, or bullock's blood, and then carefully evaporating to dryness. It may be purified for chemical purposes, by solution in boiling alcohol. Like other sugar, it may be decolored by animal charcoal. Less sweet than cane sugar. It yields by refining, 75§ of a white granular sugar, and 24§ of a kind of treacle. (Gray.)

GRAPES. Grapes may be kept by packing them in jars, (each bunch being first wrapped up in silver paper,) and covering every layer with bran, well dried, laying a little of it in the bottom of the jar; then a layer of grapes, and so on, a layer of bran and of grapes alternately, till the jar is filled: then shake it gently, and fill it to the top with bran, laying some paper over it, and covering the top with a bladder, tied firmly on to exclude the air; then put on the top or cover of the jar, observing that it fits close. These jars should be kept in a dry situation. (See APPLES; FRUIT, and FERMENTATION.)

GRAVES. *Syn.* GREAVES. The sediment of melted tallow, consisting chiefly of animal membranes mixed with fat, made up into cakes. Used as a coarse food for dogs.

GRAVY. (In COOKERY.) Strong soup or the juice of meat, spiced and flavored. (See SAUCES.)

GRAY DYE. *Syn.* TEINTURE GRISE, (*Fr.*) GRAUFARBE, (*Ger.*) *Proc.* I. Sumach 2 lbs.; logwood 1 lb.; make a decoction with water, pass the stuff through it, and afterwards through a weak iron water, (sulphate or acetate;) lastly, add

a little iron liquor to the decoction, and again turn the stuff through it. This gives a *pearl* gray.

II. Dissolve 1 lb. of tartar in 4 gals. of water, turn the stuff through the liquor for half an hour; add a decoction of galls ½ lb., and sumach 1½ lb.; put in the stuff and boil for half an hour; then take out the stuff, add sulphate of iron 1 lb., and when dissolved again, put it in, and work it well for half an hour longer. *Ash* gray. This will dye 15 to 25 lbs. of wool.

III. Galls bruised 2 lbs.; winestone 1 lb.; water 16 gallons; boil for 30 minutes, then put in the stuff, and work it well for half an hour; take it out, add 3 lbs. of green copperas, and when dissolved again, put in the goods and work them well. *Ash* gray. This will dye 60 to 70 lbs. of wool. The addition of a little alum converts this into a *mouse* gray.

IV. Pass the stuff through a weak fustic bath, and next through a *very* weak decoction of galls, to which a little alum has been added; then remove the goods, refresh the bath with a little logwood, boil half an hour, add some blue and green vitriol, and when dissolved, finish the stuff therein. *Yellowish* gray.

V. Give the stuff a *pale* blue tint in the indigo bath, then pass it through a weak decoction of galls and sumach, take it out, add a little iron liquor to the bath, and work the stuff well through it. In this way may be given every shade of *iron* gray, *slate* gray, and the other shades that turn upon the blue.

GREEK FIRE. This is supposed to have consisted of a mixture of asphaltum or pitch, nitre, and sulphur.

GREEN DYES. *Proc.* First dye the stuff *blue*, observing to regulate the shade according to that of the intended green; dry and rinse; then give it a bath of yellow dye, until the desired shade is produced. (See BLUE DYES, INDIGO, YELLOW DYE.)

GREEN PIGMENTS. *Syn.* COULEURS VERTES, (*Fr.*) GRUNE PIGMENTE, (*Ger.*) Any shade of green may be produced by the mere mechanical admixture of blue and yellow pigments. The bright blues and yellows produce the liveliest greens; orange, or red and blue, and the yellowish browns and blue, the more dingy greens. Among the green pigments of the shops, may be mentioned the following:

Green bice, or *mountain green*, is the mineral substance called *Malachite*. It is a green carbonate of copper. It is also prepared artificially.

Brunswick green, or *Bremen green*. Several preparations are sold under this name. When prepared according to the formula given at page 218, it is an oxychloride of copper, but as commonly made, it is a carbonate of copper, mixed with variable quantities of chalk, white lead, alumina, magnesia, or ammonia. The following is a good and cheap form for this article:—Dissolve blue vitriol and alum in a large quantity of water, and precipitate with a solution of carbonate of ammonia, or bone spirits; collect the powder, wash it with water, and dry it. The clear liquor may be used to make sal ammoniac. *Brunswick* green, prepared as above, is a mixed carbonate of copper and alumina. The proportion of alum employed modifies the shades of green, and also cheapens it. *Bremen green* is properly *green verditer*, but the names are usually confounded. The same may be said of *Brunswick* green, which is properly a crude oxychloride of copper, prepared according to the formula in page 218.

Friese green, or *Friesland green*, is an oxychloride of copper. (See p. 218.)

Iris green, prepared by grinding the juice of the petals of the blue flag (iris nostras) with quicklime. This green is not generally kept, and is fugitive.

Mittis green, or *Scheele's*, is an arsenite of copper, made by mixing a solution of sulphate of copper with arsenite of potassa. (See SCHEELE'S GREEN.)

Mineral green, the same as mountain green, or green bice, just noticed. (See page 217.)

Prussian green, the sediment of the process of making prussian blue from bullock's blood or horns, before it has had the muriatic acid added to it. It is also prepared by pouring liquid chlorine upon freshly precipitated prussian blue.

Sap green, prepared from the juice of buckthorn berries. The berries are allowed to ferment for a week or eight days in a wooden tub. The juice is then pressed out, strained, a little alum added, and the whole evaporated to a proper consistence; it is then run into pigs' bladders, and hung up in a dry situation, to harden. An inferior article is also made from the juice of black alder, and of evergreen privet. It is a common practice to add ¼ pint of lime-water and ½ oz. of gum arabic, to every pint of either of the above juices.

Schweinfurt green is a superior description of Scheele's green, or an arsenite of copper. (See SCHWEINFURT GREEN.)

Verditer (green,) is a mixture of oxide of copper and whiting. (See VERDITER.)

Verona green. The mineral called *green earth*.

GREGORY'S SALT. The crude hydrochlorate of morphia, prepared by Gregory's process. It is a double hydrochlorate of morphia and codeia.

GRINDSTONES, ARTIFICIAL. *Prep.* Washed silicious sand 3 parts; shellac 1 part; melt, and form it into the proper shape while warm. The fineness of the sand must depend on the work the stone is intended for. Powdered emery may be substituted for sand. The same composition is formed upon pieces of wood, for the purpose of sharpening knives, and cutting stones, shells, &c.

GRUEL. (In COOKERY.) Oatmeal or groats boiled with water to a proper consistence, and strained. It is variously flavored to suit the palate; but the addition of a little white sugar, and finely powdered Jamaica ginger, with or without a glass of wine, is least likely to offend the stomach. Nutmegs, cinnamon, &c., frequently disagree with invalids.

GUAIACINE. *Syn.* GUAIACIC ACID. A peculiar substance, discovered by Trommsdorff in the wood and bark of guaiacum officinale. *Prep.* Treat tincture of guaiacum with hydrate of lime, when a guaiacate of lime is formed, from which the acid may be obtained by sulphuric acid.

GUAIACUM. *Syn.* GUM GUAIACUM. This

substance is sometimes adulterated. The Edinburgh College states that its "fresh fracture is *red*, slowly passing to *green;* the tincture slowly strikes a lively blue color on the inner surface of a thin paring of a raw potato." (P. E.) Adulteration with resin may be generally discovered by the odor evolved when the guaiacum is heated. An alcoholic tincture of guaiacum, rendered milky with water, recovers its transparency on the addition of caustic potassa in excess; but this is not the case when resin is present.

One of the most marked properties of guaiacum is its turning blue by contact with gluten, and several other substances in the air; nitric acid and aqueous chlorine turn it successively green, blue, and brown. A delicate *photogenic* paper may be formed by first washing with an alcoholic solution of guaiacum resin, and afterwards with one of neutral acetate of lead. (Johnston.)

GUM. *Syn.* Gummi, (*Lat.*) Gomme, (*Fr.*) Gummi; Pflanzenschleim, (*Ger.*) Inspissated vegetable mucilage. The purest substance of this kind is that called *gum arabic*, or *gum acacia*. The gums are employed as demulcents in medicine, and are used as cements.

GUM-RESINS. *Syn.* Gummi resinæ, (*Lat.*) Gomme-resines, (*Fr.*) Schleimharze, (*Ger.*) Inspissated vegetable juices, consisting of extractive and resinous matter. They are partly soluble in water and in alcohol. The principal gum-resins are frankincense, scammony, asafœtida, aloes, euphorbium, galbanum, myrrh, olibanum, opoponax, ammoniacum, and gamboge.

GUNPOWDER. Under this head will be given the proportions of the ingredients employed in the manufacture of the most celebrated powders, reserving a description of their preparation for the article Pyrotechny.*

Table showing the Relative Proportions of Charcoal, Nitre, and Sulphur, contained in some of the most celebrated Gunpowders:

Authorities, or place of manufacture.	Nitre.	Charcoal.	Sulphur.
English:			
Royal Mills, Waltham Abbey	75	15	10
Sporting powder, (Marsh)	78	12	10
do. (Marsh)	76	15	9
†do. Hall, Dartford, (Ure)	76·2	14	9
†do. Pigou & Wilks, (Ure)	77·4	13·5	8·5
†do. Curtis & Harvey, (Ure)	76·7	12·5	9
†Battle powder, (Ure)	77	13·5	8
Miners' do. (Marsh)	65	15	20
Common do. (Marsh)	75	12·5	12·5
French:			
Government powder	75	12·5	12·5
Sporting do.	78	12	10
Miners' do.	65	15	20
Gunpowder of Bâle	76	14	10
do. of Grenelle	76	12	12
do. of M. Guyton Morveau	76	15	9
do. do.	77·33	13·44	9·24
do. of M. Riffault	77·5	15	7·5
United SS. Government powder	75	12·5	12·5
Russia do.	73·78	13·59	12·63
Prussia do.	75	13·5	11·5
Austria do.	72	17	16
Spain do.	76·47	10·78	12·75
Sweden do.	76	15	9
Switzerland do.	76	14	10
China do.	75	14·4	9·9
Theoretical proportion for the best gunpowder	75	13·23	11·77

GUT, FISHING. *Syn.* Silkworm Gut. *Prep.* Steep silkworms, when just ready to spin, in strong vinegar for 12 hours, in warm weather, or 2 or 3 in cold; then take them out, break them in half, stretch them out as far as possible on a board, furnished with slits or pegs to hold them, and dry them in the sun. Used by anglers. The worms may be known to be going to spin by refusing food, and by having a fine silken thread hanging from their mouths. (Nobb's Art of Trolling.)

* It is right to caution the reader of the dangerous nature of all compounds containing either gunpowder, or nitre, or chlorate of potash, in contact with combustible substances, as serious accidents have arisen from handling them carelessly. The use of metallic implements or utensils should be avoided, and the ingredients should be mixed and kept at a distance from a fire or candle.

† These powders also contained from ·5 to 1·1 of water.

HÆMATOSINE. A species of albumen on which the color of the blood is supposed to depend. It may be obtained from blood, previously well stirred to separate the fibrine, by mixing it with 6 times its volume of a saturated solution of sulphate

of soda, filtering, boiling the globules with alcohol acidulated with sulphuric acid, again filtering, adding carbonate of magnesia to separate the sulphuric acid, and after filtering, evaporating to dryness. A dark reddish-brown mass.

HÆMOPTYSIS, (from αἷμα, *blood*, and πτύω, I spit.) Spitting of blood. It generally arises from extreme fulness of the blood-vessels of the lungs, or the rupture of blood-vessels, as a consequence of ulceration. Bleeding, aperients, acidulous and astringent drinks, and nauseants, are the usual remedies. Sugar of lead, in small doses, has been recommended for this affection. It should be accompanied with a sufficient quantity of free acetic acid, to prevent its being converted into the poisonous carbonate of lead in the system.

HÆMORRHAGE. *Syn.* Hæmorrhagia, (from αἷμα, *blood*, and ῥαγη, *rent*.) A bleeding or flow of blood. Bleeding may be divided into *active*, *passive*, and *accidental*. *Active hæmorrhage* is that arising from a full state of the vessels, or plethora; *passive hæmorrhage* from general debility of the system, and the blood-vessels in particular; *accidental hæmorrhage* from external violence, as blows, wounds, &c. The *first* generally requires depletion, and the *second* the usual treatment to establish the general health and vigor of the body. The bleeding from wounds, if extensive, should be arrested by tying the ruptured blood-vessels, or where this cannot be done, and in less important cases, by the application of styptics, as creosote, sulphate of iron, infusion of galls, compound tincture of benzoin, &c.

HAIR DYES. *Prep.* I. (Dr. Hanman.) Litharge 275 grs.; quicklime 1875 grs.; hair powder (starch) 930 grs.; all in fine powder; mix. For use, this powder is made into a paste with warm water or milk, and immediately applied to the hair by means of the fingers, observing to rub it well into the roots. The whole must be then covered with a moist leaf of cotton wadding, several times doubled, and allowed to remain so for 3 hours, or preferably all night. The powder may then be removed by rubbing it off with the fingers, and afterwards washing it with warm soap and water. A little pomatum or hair oil will restore the usual gloss to the hair. This is one of the most innocent preparations of the kind. Like all other hair dyes, it must be reapplied as soon as the hair by growing begins to expose an undyed surface underneath. A piece of oil skin, or even a cabbage leaf, may be used instead of cotton wadding.

II. (Orfila's.) Litharge 6 parts; quicklime 5 parts; starch 1 part. As last.

III. (Delcroix's.) Acetate of lead 2 oz.; prepared chalk 3 oz.; quicklime 4 oz. As before.

IV. (Spencer's.) Sap green ½ dr.; nitrate of silver 1 dr.; hot water 1 oz.; dissolve. Applied to the hair by means of a comb moistened with it. Stains the skin as well as the hair.

V. (Howlet's.) Similar to the last.

VI. (*Pomade dye.*) Nitrate of silver 1 part; nitric acid 2 parts; iron filings 2 parts; mix, and let them stand together for 4 or 5 hours, then pour them on oatmeal, 2 parts; next add lard 3 parts; and mix well together. Stains the skin without great care.

VII. (*Instantaneous.*) Moisten the hair first with a solution of nitrate of silver in water, (1 to 7 or 8,) and then with a weak solution of hydrosulphuret of ammonia. The color of the hair, before unaltered, instantly turns black.

VIII. The juice of the bark of green walnuts. (Paulus Ægineta.)

IX. Employ a *leaden* comb.

Remarks. All the preceding are for dyeing living hair, (human;) horse-hair and other dead hair may be colored by steeping them in any of the ordinary dyes.

HAMS. (In Domestic Economy.) These are usually prepared from the legs of pigs, but those of the sheep are also sometimes used for the same purpose. *Smoked ham* is strong eating, and rather fit for a relish than for diet.

Choice. Stick a sharp knife under the bone, if it has a pleasant smell when withdrawn, the ham is good; but if the contrary, it should be rejected. The recently cut fat should be hard and white, and the lean fine-grained, and of a lively red. Legs of pork short in the hock should alone be chosen for making into hams, as the lanky sort not only look less sightly, but are deficient in flavor.

Curing. Hams are prepared in the usual way for salting, either by immersion in the pickle, or by rubbing the salt over them. A little powdered saltpetre should be well rubbed over them an hour before salting them: moist sugar is frequently mixed with the salt, or treacle is put into the brine to improve the flavor; a little spice (powdered allspice) and black pepper are also occasionally used for a like purpose. An ordinary sized ham will require nearly three weeks, if *wet* salted, and about a month if *dry* salted, to cure it perfectly. At the expiration of this time, they are ready for smoking. *Mutton hams* are prepared in a similar manner, but should not lie in pickle longer than 12 days or a fortnight. (See Animal Substances used as Food, and Salting.)

Cooking. Preparatory to the cooking of hams, they should be well soaked in water, to which a little vinegar or milk may be added. They are also preferably boiled in milk and water, or water alone, along with some heads of celery, 2 or 3 turnips, 5 or 6 onions, and a handful of sweet marjoram, thyme, and basil. Hams should be put into the water *cold*, and should be gradually heated. A ham of 16 lbs. will take 4½ hours, and one of 20 lbs. 5½ hours to dress it properly. (See Baking.)

HAMS, PRESERVATION OF. Most grocers, dealers in hams, and others, who are particular in their meat, usually take the precaution to case each one, after it is smoked, in canvass, for the purpose of defending it from the attacks of the little insect, the dermestes lardarius, which, by laying its eggs in it, soon fills it with its larvæ, or maggots. This troublesome and expensive process may be altogether superseded by the use of pyroligneous acid. With a painter's brush, dipped in the liquid, one man, in the course of a day, may effectually secure two hundred hams from all danger. Care should be taken to insinuate the liquid into all the cracks, &c., of the under surface. This method is especially adapted to the preservation of hams in hot climates.

HANDS. *Dirty and coarse hands* are no less

the marks of slothfulness and low breeding, than clean and delicate hands are those of cleanliness and gentility. To promote the softness and whiteness of the skin, mild emollient soaps, or those abounding in oil, should alone be used, by which means chaps and chilblains will generally be avoided. The coarse, strong kinds of soap, or those abounding in alkali, should for a like reason be rejected, as they tend to render the skin rough, dry, and brittle. The immersion of the hands in alkaline lyes, or strongly acidulated water, has a like effect. When the hands are *very* dirty, a little good soft soap may be used with warm water, which will rapidly remove oily and greasy matter. *Fruit and ink stains* may be taken out by immersing the hands in water slightly acidulated with oxalic acid, or a few drops of oil of vitriol, or to which a little pearlash or chloride of lime has been added, observing afterwards to well rinse them in clean water, and not to touch them with soap for some hours, as any alkaline matter will bring back the stains, after their apparent removal by all the above substances, except the last. The use of a little chloride of lime and warm water, or GOWLAND'S LOTION, will impart a delicate whiteness to the skin; but the former should be only occasionally used, and should be well washed off with a little clean water to remove its odor. The use of a little sand, or powdered pumice-stone, with the soap, will generally remove the roughness of the skin, frequently induced by exposure to cold. The hands may be preserved *dry* for delicate work, by rubbing a little club moss, (lycopodium,) in fine powder, over them. A small quantity of this substance sprinkled over the surface of a basin of water, will permit the hand to be plunged to the bottom of the basin without becoming wet. (See COSMETIC, SIMPLE.)

HANNAY'S LOTION. *Syn.* HANNAY'S PREVENTIVE WASH. A solution of potash in water. Used to prevent infection.

HARDNESS. *Syn.* DURETE, (*Fr.*) HARTE; FESTIGKEIT, (*Ger.*) DURITIA; DURITIES, (*Lat.*) In PHYSICS, the power possessed by bodies of resisting abrasion. In MINERALOGY, mineral substances are frequently distinguished and identified by their relative hardness. This is ascertained by their power to scratch or be scratched by one another. A valuable table on this subject will be found under the article GEM, p. 331.

HARMALINE. A basic substance, forming yellow-brown crystals, discovered by Göbel in the seeds of peganum harmala. It has a bitter astringent and acrid taste, and forms yellow soluble salts with the acids. It has been proposed as a yellow dye. By *oxidation* it yields a magnificently red dye-stuff, which is easily prepared and applied. (Göbel.) The seeds are produced abundantly in Russia, so that it appears probable that, ere long, they may become an article of commerce.

HARTSHORN, BURNT. *Syn.* CORNU USTUM, (P. L.) PULVIS CORNU CERVINI USTUM, (P. D.) CORNU USTUM ALBUM. *Prep.* (P. L.) Burn pieces of harts' horns until perfectly white, then grind and prepare them in the same way as directed for PREPARED CHALK.

Remarks. Finely-powdered bone-ash is usually sold for burnt hartshorn, and possesses exactly the same properties. *Dose.* 10 grs. to ℈ss 2 or 3 times a day, in rickets, &c. (See PHOSPHATE OF LIME.)

HARTSHORN SHAVINGS. *Syn.* HARTSHORN RASPINGS. RASURA CORNU CERVI. RAMENTA CORNU CERVI. Obtained from the turners. By boiling in water they yield a nutritive jelly. Used by straw-plait workers to stiffen bonnets, &c.

HATS. In purchasing a hat, choose one possessing a *short*, smooth, fine nap, and a good black color; and that is light and sufficiently elastic to resist ordinary wear and tear, without breaking or giving way. The hat brush for *daily* use should be made of long soft hairs, but a stiffer one should be employed *occasionally*, to lay the nap smooth and close.

HEADACHE. *Syn.* CEPHALALGIA, (*Lat.*) The symptoms of this very general complaint are too well known to require any description. According to pathologists, headache arises, either from a sympathy with the stomach and chylopoietic (chyle-forming) viscera, or from a weakness or exhaustion of the power of the encephalon. The former may be called *sympathetic*, and the latter *nervous headache*. The treatment of the first should consist in restoring the healthy action of the stomach by the administration of aperients, and the use of proper food and exercise, or when that viscus is overloaded with undigested food, by the exhibition of an emetic. For this purpose ¼ to ½ an oz. of ipecacuanha wine may be taken in a cupful of warm water, which will generally relieve the stomach, especially if its action be assisted by drinking copiously of warm water. (See EMETICS.) Headache is a common accompaniment of indigestion and stomach diseases, and in general it will be found that whatever will remove the latter will also cure the former. (See DYSPEPSIA.) *Nervous headaches* are relieved by nervous tonics and stimulants; as bark, cascarilla, calumba, gentian, camphor, ammonia, ether, and wine; the latter in a state of considerable dilution. A cup of strong coffee or strong green tea often acts like a charm in removing this species of headache. Small doses of tincture of henbane will also have a like effect. 20 or 30 drops of laudanum, or preferably, half that number of liquor opii sedativus, may be taken with advantage as an anodyne, and to induce sleep. Among *popular remedies* may be mentioned "nasal stimulants," as snuff, (cephalic,) smelling salts, and aromatic vinegar, the use of which is familiar to every one; and local applications, as very cold water, ether, vinegar, strong spirits, Cologne water, &c., all of which are rubbed over the part of the head affected, with the fingers; or a linen rag dipped in them is laid thereon instead. Pressure on the head has also been used with advantage. Silence, darkness, and repose, are also powerful remedies, alike suitable to every variety of headache; and change of air, scene, and occupation, are especially beneficial to those resulting from excessive mental anxiety or exertion. Blisters are sometimes applied behind the ears in cases of violent headache.

Headache is often symptomatic of other diseases, especially those of the inflammatory and nervous kind, rheumatism, &c. In all these cases, the primary disease should be sought out and attempted to be cured. *Headache in pregnancy* may

generally be removed by proper attention to the bowels; observing to assist their action, should they require it, by the use of some mild aperient, as castor oil, lenitive electuary, seidlitz powders, &c. Where the constitution is very robust, blood may be taken. *Headache in bed* may frequently be relieved by washing the head with cold water, and discontinuing the use of a nightcap; at the same time preserving the feet warm by wearing worsted socks or stockings.

HEADING. *Syn* Beer Heading. Cauliflower do. *Prep.* I. Alum and green copperas equal parts, both in fine powder; mix.

II. Alum, copperas, and common salt, of each equal parts; mix.

Used by brewers to make their beer keep its head.

HEARTBURN. *Syn.* Cardialgia; Cordolium, (*Lat.*) Anxiety and pain about the region of the stomach, generally attended by a sense of gnawing and heat; hence called *heartburn.* Faintness, nausea, and eructation of a thin, acidulous, watery liquid, especially in the morning, are common symptoms of this complaint. The usual causes of heartburn are excess in eating or drinking, the use of improper food, and sedentary habits. A good remedy is a teaspoonful of carbonate of magnesia, or carbonate of soda, in a glass of peppermint or cinnamon water, to which a little powdered ginger may be added with advantage. This dose may be taken 2 or 3 times daily until the disease is removed. Articles of food that easily undergo fermentation should at the same time be avoided, and a *dry* diet had recourse to as much as possible. Soda-water, toast and water, and weak spirits and water, are the most suitable beverages in this complaint.

HELENINE. *Syn.* Elecampane Camphor. A peculiar substance obtained from the fresh root of inula Helenium, by digestion in hot alcohol or distillation along with water. It is crystalline, soluble in alcohol, ether, and essential oils, melts at 162°, and boils about 530° F.

HEMATINE. *Syn.* Hæmatine. Hæmatoxylin. A peculiar principle obtained by Chevreul from common logwood, (Hæmatoxylon campechianum,) and on which its color appears to depend.

Prep. I. Infuse logwood chips in water, at a temperature of about 130° F., for 12 hours, filter, evaporate to dryness in a water-bath, digest in alcohol of 0·835 for 24 hours, again filter and evaporate; then add a *little* water, again gently evaporate and set aside the solution in a cold place that crystals may form; these must be washed in alcohol and dried.

II. Digest powdered hard extract of logwood in alcohol of 0·835 and proceed as last.

Prop., &c. It forms brilliant reddish-white crystals, soluble in boiling water, forming an orange-red solution which turns yellow as it cools, but resumes its former color on being heated. Alkalis in excess change its color successively into purple, violet, and brown; with the metallic oxides it forms compounds, having a blue, purple, or violet color.

HEMIDESMIC ACID. *Syn.* Smilasperic Acid. A volatile and crystallizable substance obtained by Mr. Garden from the root of hemidesmus indicus. It possesses the taste and odor of the root.

HEPAR, (*Lat.*, from Ἧπαρ, the liver.) A name given by the older chemists to various combinations of sulphur, from their brown color; as *hepar sulphuris*, (sulphuret of potassium,) *hepar antimonii*, (crude oxysulphuret of antimony,) &c.

HERBS *for medical purposes* should be collected as soon as they begin to flower, and on a *dry* day, after the dew and moisture deposited on them during the night have evaporated. The biennial narcotic plants should not be collected until the *second* year of their growth, as, during the *first* year, they are mucilaginous and nearly inert. The younger plants possess, however, the brightest green color, and make the most showy extracts, for which reason they are frequently purchased by the druggists of the herb collectors, without an examination being made into their value as remedies. This is one of the causes of the general inferiority of the extracts of the shops which are prepared from the expressed juices of narcotic plants. Color alone is cared for. Chlorophyle, which constitutes the green portion of vegetables, is a resinous substance, which has been fully proved to be wholly destitute of medicinal virtue.

Herbs are dried by spreading them thinly on trays, and exposing them to the heat of the sun, or a current of dry air, or by placing them in a stove-room; observing in either case to turn them repeatedly. When dried in the sun they should be covered with thin paper to prevent their color being injured by the light. The quicker they are dried the better, as "heating" or "fermentation" will be thereby prevented. When sufficiently dried, they should be shaken in a *coarse* sieve to remove any sand or the eggs of insects that may be mixed with them. Aromatic herbs should be dried very quickly, and by a gentle heat, that their odor may be preserved. *Tops and leaves* are dried in the same way as whole plants. In every case discolored and rotten leaves and branches should be rejected, and earth and dirt should be screened off before proceeding to dry them.

HESPERIDIN. A peculiar substance obtained from the white portion of the rind of oranges, lemons, &c. It forms crystalline silky needles, is odorless, tasteless, fusible, soluble in alcohol, and reddened by oil of vitriol.

HICCOUGH. *Syn.* Hiccup. Singultus, (*Lat.*) A convulsive motion of the diaphragm and parts adjacent. The common causes are flatulency, indigestion, acidity, and worms. It may usually be removed by the exhibition of warm carminatives, cordials, cold water, weak spirits, camphor julep, or spirits of sal volatile. A sudden fright or surprise will often produce the like effect. An instance is recorded of a delicate young lady that was troubled with hiccough for some months, and who was reduced to a state of extreme debility from the loss of sleep occasioned thereby, who was cured by a fright, after medicines and topical applications had failed. A pinch of snuff, a glass of *cold* soda-water, or an ice-cream, will also frequently remove this complaint.

HIERA PICRA. *Syn.* Powder of aloes and canella. Pulvis aloes cum canella. (From ἱερος, *holy*, and πικρος, *bitter.*) Holy bitter. This name was formerly applied to an aloetic electuary, made of honey. It is now kept in the form of a dry powder.

Prep Hepatic aloes 4 lbs.; white canella 1 lb.; reduce to fine powder.

Remarks. Inferior aloes are commonly used for this preparation. It is cathartic in doses of 10 to 20 grs.

HIPPOCRAS. *Prep.* Lisbon and canary wine, of each 12 pints; cinnamon 2 oz.; white canella, ½ oz.; cloves, mace, nutmeg, ginger, and galangal, of each 1 dr.; bruise the spices, and digest them in the wine for 3 or 4 days; strain, and add lump sugar 2½ lbs. An aromatic wine formerly much used in England.

HIPPURIC ACID. (From ἵππος, a *horse*, and οὖρον, *urine*.) A new acid, discovered by Liebig, in the urine of the horse, cow, and other graminivora.

Prep. Concentrate the urine by a gentle heat, acidulate with muriatic acid, and set it aside to crystallize. It may be decolored by re-solution in boiling water, and treating it with animal charcoal, or chloride of lime, along with a little muriatic acid, and recrystallizing.

Remarks. This acid is soluble in 400 parts of cold water, but is easily dissolved by boiling water. When strongly heated, benzoic acid and benzoate of ammonia distil over in a liquid state, accompanied by a strong odor of Tonka beans, and afterwards by hydrocyanic acid. "The urine of horses or cows, left to itself for some time, or evaporated at a boiling temperature, yields not a trace of hippuric acid, but only benzoic acid." Nitric acid converts hippuric into benzoic acid. (See BENZOIC ACID.)

HIRCIC ACID. A name given by Chevreul to an oily liquid, obtained by saponifying the fat of goats. It is prepared in the same way from goat fat, as capric, caproic, and butyric acids are from butter. It is soluble in alcohol, and possesses a mixed smell of vinegar and goats. With the bases, it forms salts called *hircates*.

HIRCINE. (From *hircus*, a he-goat.) An oily fluid extracted by Chevreul from goat-fat, and which may also be obtained from mutton suet. It smells strongly of the male goat. By saponification it yields HIRCIC ACID.

HOLLANDS. *Syn.* HOLLANDS GIN. GENEVA. JENEVER BRANDEWYN, (*Ger.*) SPIRIT OF JUNIPER. SPIRITUS JUNIPERI. *Prep.* I. The following description of the manufacture of hollands comes on the authority of Robert More, Esq., formerly of Underwood, distiller, "who, after studying the art at Schiedam, tried to introduce that spirit into general consumption in this country, but found the palates of our gin-drinkers too much corrupted to relish so pure a beverage."

"The materials employed in the distilleries of Schiedam are, two parts of unmalted rye from Riga, weighing about 54 lbs. per bushel, and one part of malted bigg, weighing about 37 pounds per bushel. The mash tun, which serves also as the fermenting tun, has a capacity of nearly 700 gallons, being about 5 feet in diameter at the mouth, rather narrower at the bottom, and 4½ feet deep; the stirring apparatus is an oblong rectangular iron grid, made fast to the end of a wooden pole. About a barrel (36 gallons) of water, at a temperature of from 162° to 168°, (the former being the best heat for the most highly-dried rye,) is put into the mash tun for every 1½ cwt. of meal, after which the malt is introduced and stirred, and lastly the rye is added. Powerful agitation is given to the magma till it becomes quite uniform; a process which a vigorous workman piques himself upon executing in the course of a few minutes. The mouth of the tun is immediately covered over with canvass, and further secured with a coarse wooden lid, to confine the heat; it is left in this state for two hours. The contents being then stirred up once more, the transparent spent wash of a preceding mashing is first added, and next as much cold water as will reduce the temperature of the whole to about 85° F. The best Flanders yeast, which had been brought, for the sake of carriage, to a doughy consistence by pressure, is now introduced to the amount of 1 lb. to every 100 gallons of the mashed materials. The gravity of the wort is usually from 33 to 38 lbs. per Dicas' hydrometer; and the fermentation is carried on for from 48 to 60 hours, at the end of which time the attenuation is from 7 to 4 lbs.; that is, the sp. gr. of the supernatant wash is from 1·007 to 1·004. On the third day after the fermenting tun is set, the wash containing the grains is transferred to the still, and converted into low wines. To every 100 gallons of this liquor, 2 lbs. of juniper berries, from 3 to 5 years old, being added, along with ¼ lb. of salt, the whole are put into the low-wine still, and the fine hollands spirit is drawn off by a gentle and well-regulated heat till the magma becomes exhausted; the first and last products being mixed together, whereby a spirit 2 to 3 per cent. above our hydrometer proof is obtained, possessing the peculiar fine aroma of gin. The product varies from 18 to 21 gallons per quarter of grain; this large quantity being partly due to the employment of the spent wash of the preceding fermentation; an addition which contributes at the same time to improve the flavor." (Ure's Dict. of Arts, &c., pp. 571–2.)

To the preceding it may be added that the yeast is skimmed off the fermenting tuns and sold to the bakers; which is said to lessen the production of spirit, but to improve its quality. The ingredients are also reduced to the state of coarse meal before mashing them.

Remarks. It will be seen from the preceding statement, to the accuracy of which the writer of this article bears willing testimony, that the superior flavor of hollands spirit depends more on the peculiar mode of its manufacture than on the quantity of juniper berries employed; 2 lbs. of that substance, when new, being equivalent to less than 5 drachms of the essential oil, and when old, only to about 2 drachms; a quantity wholly insufficient to flavor 100 gallons of spirit. Besides, as already noticed, the flavor of hollands *differs considerably* from that of juniper; the latter being merely employed as a modifying ingredient. Most of the Dutch distillers add a little *pure* Strasburgh turpentine, and a handful or two of hops to the spirit, along with the juniper berries, before rectification. The former substance has a pale yellowish brown color, and a very fragrant and agreeable smell, and tends materially to impart that fine aroma for which the best Geneva is so much distinguished. The principal part of the secret lies, however, in the careful management of the process. The numerous published receipts for hollands gin, in which 2 or 3 oz. of oil of juniper, and as many

pounds of juniper berries, are ordered to only 20 or 25 gallons of proof spirit, tend only to deceive those who adopt them. At Rotterdam sweet fennel seeds are occasionally added as a flavoring; and at Weesoppe, Strasburgh turpentine, fennel seeds, or the essential oil, are frequently wholly substituted for juniper berries.

Schiedam hollands is considered the best; the next quality is that of Rotterdam; and afterwards, that of Weesoppe. Hollands spirit pays a duty of 22*s*. 6*d*. per proof gallon, which is the same as that on French brandy. See GIN.

II. (*Best hollands. Brandewyn von Koorn voorloof drie quart.*) Hollands rectified to the strength of 24° Baume, (sp. gr. 0·9125.) The strength of this spirit alone is no proof of its superior quality.

III. Digest 2 or 3 lbs. of good old juniper berries in 1 or 2 gallons of rectified spirit of wine for a week or 10 days, then express the liquor, filter it through blotting paper, add it to 90 or 100 gallons of good corn spirit at 2 or 3$\frac{8}{8}$ over proof, and mix them by thorough agitation.

IV. Juniper berries 2 to 4 lbs.; sweet fennel seeds 4 or 5 oz.; caraway seeds 3 or 4 oz.; spirit of wine 1 or 2 gallons; corn spirit 90 or 100 gallons. As last.

V. Juniper berries, fennel seeds, caraways, and spirit, as last; Strasburgh turpentine, a *little*. Proceed as in No. III.

Remarks. The last three forms produce very pleasant spirits, if kept for some time to mellow; age is *one* of the reasons of the creaminess of foreign gin, which usually lies in bond for some time before being consumed. The product is, however, much superior if the ingredients are put into a still along with 20 gallons of water, and the spirit drawn over by a moderate heat. In this case, it will be an improvement to employ some good plain-flavored English gin, instead of plain corn spirit, if the expense is no object. I have mentioned certain quantities of the flavoring ingredients to be employed, as a guide to the reader; but the *actual* quantities required in practice depend on their quality, and the taste of the consumer. The same remark also applies to the following. The imitation of hollands, like that of brandy, chiefly depends on the experience and discretion of the workman.

VI. Oil of juniper 4 oz.; oil of turpentine 5 oz.; oils of caraways and sweet fennel, of each 1 oz., (all quite pure;) rectified spirit of wine 1 gallon; dissolve by occasionally agitating them well together in a corked bottle for 2 or 3 days, then add it gradually to clean corn spirit or plain gin until the required flavor is produced, observing not to use too much. *Product*. Good, if kept for some time.

HONEY. *Syn*. MEL, (*Lat. and Fr.*) HONIG, (*Ger.*) The sweet substance elaborated by the bee from the juices of the nectaries of flowers, and deposited in the cells of wax forming the honey-comb. Pure honey consists of a sirup of uncrystallizable sugar and crystalline saccharine grains, resembling grape sugar. *Virgin honey* is that which flows spontaneously from the comb; *ordinary honey*, that obtained by heat and pressure. The former is pale and fragrant; the latter darker, and possessing a less agreeable taste and smell. *English honey* (Mel Anglican) is chiefly collected from furze and broom flowers, and is more waxy than that from the South of Europe;—*Narbonne honey*, (Mel Narbonense,) chiefly from rosemary, and other labiate flowers, very fine;—*Minorca honey*, (Mel Minorcense;)—*East country honey*, inferior and bad tasted;—*Poisonous honey*, found near Trebisond, in Asia, narcotic and poisonous.

Uses, &c. Honey is nutritive and laxative, but very apt to gripe. It is employed in the preparation of oxymels and gargles, and also to cover the taste of nauseous medicines, which it does better than sugar. Clarified honey is alone ordered to be used in medicine.

Pur. Honey is frequently adulterated with treacle, starch, and wheat flour. The first may be detected by the color and odor, and the others by the honey not forming *a nearly* clear solution with cold water, and striking a blue color with iodine.

HONEY, CLARIFIED. *Syn*. MEL DESPUMATUM. *Prep*. I. (P. L. and D.) Melt the honey in a water-bath, remove the scum, and pour off the clear. Less agreeable than raw honey, but not so apt to ferment and gripe.

II. (Siller.) Any quantity of honey is dissolved in an equal part by weight of water. The liquid is allowed to boil up 4 or 6 times without skimming; it is then removed from the fire, and after being cooled, brought on several strong linen strainers, stretched horizontally, and covered with a layer of clean and well-washed sand an inch in depth. When the solution has passed through the strainers, it is found to be of the color of clear white wine; the sand being allowed to remain on the strainers, is rinsed with cold water, and the whole of the liquor is finally evaporated to the thickness of sirup.

III. Dissolve the honey in water, clarify with the white of egg, and evaporate to a proper consistence.

IV. Dissolve in water, add 1$\frac{1}{2}$ lb. of animal charcoal to every $\frac{1}{4}$ cwt. of honey, gently simmer for 15 minutes, add a little chalk to saturate excess of acid, if required; strain or clarify, and evaporate.

Remarks. Honey acquires a darker color if heated in copper or iron vessels; the above processes should therefore be conducted in earthen or well-tinned copper pans.

HONEY, HELLEBORE. *Syn*. MEL HELLEBORATUM. *Prep*. (P. L. 1746.) Hellebore root, bruised, lb. j; water 4 pints; digest for 3 days; boil, strain, and add honey lb. ij; boil to a sirup. Cathartic, in mania.

HONEY, LIQUORICE. *Syn*. MEL GLYCYRRHIZATUM. *Prep*. (Hamb. Ph.) Honey and a strong infusion of liquorice boiled to a proper consistence.

HONEY, MERCURIAL. *Syn*. MEL MERCURIALE. *Prep*. (P. L. 1746.) Juice of the herb mercury and honey, of each equal parts; boil to a proper consistence.

HONEY OF BORAX. *Syn*. MEL BORACIS (P. L.) MEL SUBBORACIS. *Prep*. (P. L.) Powdered borax ʒj; clarified honey ℥j; mix. Astringent, detersive, and cooling. It is employed in aphthæ of the mouth and excessive salivation. It is *incompatible* with acids, and is decomposed by compound infusion of roses, with which it is commonly ordered.

HONEY OF MERCURY. *Syn.* MEL HYDRARGYRI. *Prep.* (Bell.) Quicksilver ℈j; honey ℥j; triturate till the globules disappear. Properties similar to mercurial pill.

HONEY OF MERCURY, COMPOUND. *Syn.* MEL HYDRARGYRI COMPOSITUM. *Prep.* (P. C.) Quicksilver ℈ij; clarified honey ℥ij; oil of cloves ℈j; as last.

HONEY OF ROSES. *Syn.* MEL ROSÆ. *Prep.* (P. L.) Dried petals of the red rose ℥iv; boiling water 2½ pints; macerate for 6 hours, strain, add honey lb. v; and evaporate in a water-bath to a due consistence. Used to make astringent gargles. It must not be boiled in a copper or iron vessel, as they will spoil the color.

HONEY OF SQUILLS. *Syn.* MEL SCILLÆ. *Prep.* Clarified honey lb. iij; tincture of squills lb. ij; mix well. Properties and uses the same as oxymel of squills.

HOP. *Syn.* HOUBLON, (*Fr.*) HOPFEN, (*Ger.*) HUMULUS LUPULUS, (*Lat.*) The hop or hops of commerce, are the strobiles or catkins of the hop plant. In the choice of hops, care should be taken to select those that have large cones or strobiles, that are the most powerfully odorous, and most free from leaves, stems, scaly fragments, and sticks, and which, when rubbed between the hands, impart a yellowish tint and glutinous feeling to the skin. The tightness with which they are packed should also be noticed; as without being very firmly pressed together, and quite solid, they soon spoil by keeping. The finest flavored hops are those grown in East Kent, and termed the "*golden bine;*" these possess a lively golden yellow color, and are principally employed for the finer class of ales. *Mid Kent and Sussex hops* are also used for ale, but have an inferior color and flavor. *Countrys and Farnham hops* have a greenish yellow color, and are more expensive than any other variety; but are only used for malt liquor that it is intended to keep for a long time, as they do not impart their flavor to the beer before it has been kept at least a year. They are chiefly used for ale. The best hops are packed in sacks of fine canvass, termed "*pockets,*" weighing from 1¼ cwt. to 1¾ cwt. each; and the inferior qualities in coarse "*bags,*" of about double the size. The former are mostly purchased by the ale, and the latter by the porter brewers. When hops are older than of the last season's growth, they are termed "*yearlings,*"—when of the second season's growth, "*olds,*"—and when three years, or older, "*old olds.*" (See EXTRACT OF HOPS, and BREWING.)

HORDEINE. (From *hordeum*, barley.) This name was given by Proust to the peculiar starchy matter of barley meal; but according to Raspail, it is merely bran more minutely divided than that which remains in the sieve.

HOREHOUND. *Syn.* WHITE HOREHOUND. MARRUBIUM VULGARE. This herb is a popular remedy in chronic pulmonary complaints, especially catarrh, and in uterine and liver affections. *Horehound tea* (thea vel infusum marubii) is prepared by infusing 1 oz. of the herb in boiling water for 1 hour; *sirup of horehound,* (syrupus marubii,) by thickening the infusion or tea with sugar; *candied horehound,* (marrubium conditum,) by mixing horehound juice 1 pint, with white sugar 4 lbs., and moist sugar 6 lbs., or white sugar alone 10 lbs., boiling to a candy height, and pouring it, while warm, into moulds or small paper cases, well dusted with finely-powdered lump sugar; or it is poured out on a dusted slab, and cut into squares.

HORN is *dyed* with the same dyes, and in a similar manner to bones and ivory. (See page 125.) *Horn is softened, bent,* and *moulded* by means of heat and pressure.

HUILE ACOUSTIQUE. *Prep.* Bullock's garlic and bay leaves, of each ℈iv; olive oil lb. ss; boil for 15 minutes, and strain. *Used* for earache and deafness; a little dropped on cotton wool and placed in the ear.

HUILE D'ANIS. Aniseed, bruised, ¼ lb.; spirit of wine 1 gallon; digest a week, strain, and add sugar 1½ lb. It may be made of star anise seed, and proof spirit may be substituted for spirit of wine. Cordial and pectoral.

HUILE ANTIQUE. *Prep.* I. (*Plain.*) *a.* Olive oil 1 pint; oil of vitriol ½ oz.; mix, agitate well in a *corked* bottle for 1 hour, then allow it to repose in the sun, or a moderately warm situation, for 12 or 14 days, after which time decant the clear portion from the sediment. *b.* Oil of ben nuts filtered; this never gets rank. *c.* Olive oil filtered. All the above keep the hair moist, and may be scented at pleasure.

II. (*Huile antique à la rose.*) *a.* Either of the above scented with otto of roses. *b.* Rose leaves and blanched sweet almonds, equal parts; grind them together, then express the oil, and either filter it through blotting paper, or allow it to deposite in a closely-corked bottle. *c.* Use blanched *bitter* almonds instead of *sweet* ones *Remarks.* The first two keep the hair moist; the last one dries it. The same is the case with all those that follow where *bitter* almonds are used.

III. (*Huile antique à la tuberose.*) As the last.

IV. (*Huile antique à la fleur d'orange.*) Plain HUILE ANTIQUE scented with NEROLI, or orange flowers and almonds pressed together, as in No. II.

V. (*Huile antique au jasmin.*) From oil of jasmin, or jasmin flowers, as the last.

VI. (*Huile antique à la violette.*) Plain huile antique, scented with powdered orris root, by keeping them together at a *gentle* heat in a covered vessel for 24 hours, and filtering when cold.

VII. (*Huile antique aux mille fleurs.*) Plain huile antique, scented with several perfumes, so that none may predominate.

VIII. (*Huile antique verte.*) Plain huile antique 1 pint; gum guaiacum, bruised, ¼ oz.; dissolve by placing the bottle in a water-bath; when cold, filter through paper, and scent to your pleasure.

IX. (*Huile antique rouge à la rose.*) Plain huile antique 1 pint; alkanet root 1 dr.; digest in a gentle heat until sufficiently colored, then strain, and add otto of roses 20 drops, oil of rosemary and oil of neroli, of each 5 drops.

HUILE LIQUEREUSE DE LA ROSE. *Prep.* Rose water and simple sirup, equal parts. A pleasant and fragrant sweetening for grog, liqueurs, &c.

HUILE LIQUEREUSE DES FLEURS

D'ORANGES. *Prep.* Orange-flower water and simple sirup, equal parts. More fragrant and agreeable than the last. Gives a delicious flavor to grog, liqueur, &c., and to perfume the breath.

HUILE DE VANILLE. *Prep.* Spirit of wine and simple sirup, of each 1 quart; essence or tincture of vanilla, a sufficient quantity to flavor; mix. This should be kept in a decanter. *Used* to flavor liqueurs, &c.

HUILE DE VENUS. *Prep.* I. Flowers of the wild carrot 5 oz.; spirit of wine 1 gallon; water 1 pint; macerate 24 hours, then distil 1 gallon, and add an equal measure of capillaire or simple sirup.

II. Wild carrot flowers 4 oz.; spirit of wine 1 gallon; macerate for 1 week, strain, and add capillaire 1 gallon. If preferred colored, steep ½ oz. of cochineal in it. A pleasant cordial.

HUMUS. When wood, or woody fibre, is exposed to the joint action of air and moisture, it suffers decay or eremacausis, and moulders down into a dark-brown or black powder, commonly called MOULD, and to which chemists have given the name HUMUS. By the action of alkalis, it is converted into *humic acid*, which is soluble, and forms salts called *humates*.

HUSBANDRY. This term is applied to the joint operations of farming and gardening on the small scale, and it is also sometimes used synonymously with agriculture. (See AGRICULTURE, FARMING, MANURES, and SOIL.)

HYDRARGYRO-CHLORIDES. Salts in which the bichloride of mercury plays the part of an acid. The only one that has been applied to any useful purpose, is the hydrargyro-chloride of ammonia, or the *sal alembroth* of pharmacy. Perhaps *white precipitate* may also belong to the same class. Similar salts have been formed with the chlorides of other metals, to which the names *auro-chlorides, cupro-chlorides, ferro-chlorides, cobalto-chlorides,* &c. &c., have been applied.

HYDRARGYRO-IODO-CYANIDE OF POTASSIUM. *Prep.* Add a concentrated solution of bicyanide of mercury to a solution of iodide of potassium, as long as a white, pearly, crystalline precipitate is formed. *Used* to ascertain the purity of prussic acid; if a small portion be put into this acid, in a dilute state, red biniodide of mercury will immediately be formed, if any foreign acid be present.

HYDRARSINE. An ethereal, volatile substance, having an intolerably fetid odor, formed by the action of air on *alkarsine*.

HYDRATE. (From ὕδωρ, *water*.) In CHEMISTRY; a compound containing water, in definite proportion. Thus, slaked lime is a *hydrate of lime*; caustic potassa, a *hydrate of potassa;* and oil of vitriol, a *hydrate of sulphuric acid*.

HYDRATED. (In CHEMISTRY.) Chemically combined with water. Thus, the crystallized vegetable acids, (citric, tartaric, oxalic,) and salts (epsom salts, carbonate of soda, &c.) that contain combined water, are called *hydrated acids* and *hydrated salts*. The term *hydrated* is used as an adjective, in the same way as hydrate is as a substantive. The former is, however, usually applied to compound names, as *hydrated acetic acid, hydrated oxide of iron,* &c., and the latter, for the sake of euphony, to simple names, as *hydrate of lime, hydrate of potassa,* &c.

HYDRIODATE. *Syn.* HYDRIODAS, (*Lat.*) A compound formed of the hydriodic acid with a base. The hydriodates may be easily formed by saturating the acid with the oxides or hydrates of the bases, or more economically, by acting on the bases in water, with iodine. (See IODINE, IODIDES, and HYDRIODIC ACID.)

HYDRIODIC ACID. *Syn.* ACIDUM HYDRIODICUM. *Prep.* Pour a little water over some periodidi of phosphorus, previously put into a small glass retort, and apply a gentle heat, when hydriodic acid will be evolved, and phosphoric acid remain behind. The gas may be either collected over mercury or passed into water, when *liquid hydriodic acid* will be formed.

II. (F. D'Arcet.) Evaporate hypophosphoric acid until it begins to yield phosphoreted hydrogen, then mix it with an equal weight of iodine placed in a retort; apply a gentle heat as before, and collect the evolved gas. The products of both this and the former process possess great purity.

III. (Dr. Glover.) Place iodide of barium in a retort, and decompose it with sulphuric acid, when pure hydriodic acid will be evolved.

IV. (*Liquid.*) Pass sulphureted hydrogen through a mixture of iodine and water, in a Woolf's bottle, until saturated, then gently heat the liquid until the excess of sulphur flies off. An economical process, but does not yield the pure acid.

V. (*Dr. Buchanan's medicinal hydriodic acid.*) Tartaric acid 264 grs.; pure iodide of potassium 330 grs.; dissolve each separately in water f℥iss, mix the solutions, and when settled, decant the clear liquid and add water to make up f℥vj ʒij. This liquid acid retains a little bitartrate of potassa in solution, but which does not interfere with its medicinal properties. (See IODINE and HYDRIODATE.)

HYDRO. (In CHEMISTRY.) A prefix employed to designate the compounds of hydrogen; as *hydrochloric acid, hydrobromic acid,* acids formed of chlorine, bromine, and hydrogen. It is sometimes, though improperly, used synonymously with the word *hydrated*. (See HYDRATE and HYDRATED.)

HYDROBENZAMIDE. A substance discovered by Laurent, and prepared by mixing pure hydruret of benzule with 20 times its volume of concentrated water of ammonia, in a stoppered bottle, and keeping the mixture for some hours at a heat of 100 to 120°. The crystalline mass thus formed is washed with cold ether, when pure hydrobenzamide is left, and may be obtained in crystals by re-solution in alcohol, and spontaneous evaporation.

HYDROBROMATE. *Syn.* HYDROBROMAS. A compound of hydrobromic acid and a base.

HYDROBROMIC ACID. *Syn.* ACIDUM HYDROBROMICUM. An acid compound of hydrogen and bromine. It may be prepared from the bromide of phosphorus in a similar way to that for forming hydriodic acid from periodide of phosphorus. It may also be prepared by decomposing bromide of barium with sulphuric acid, when pure hydrobromic acid will be evolved. (Dr. Glover.) It should either be collected in dry glass bottles, in the manner directed for chlorine, or over mercury,

in the pneumatic trough. When passed into water it forms liquid hydrobromic acid. The pure liquid acid cannot be made by passing sulphureted hydrogen through water mixed with bromine, as is commonly practised.

Prop., &c. A colorless, acidulous, and pungent gas, or a limpid fluid. With the bases it forms salts called hydrobromates. These are formed in a similar way to the hydriodates. (See BROMINE.)

HYDROCARBURETS. *Syn.* HYDROCARBONS. Compounds of hydrogen and carbon. The principal of these are—1. *Light carbureted hydrogen,* or the fire-damp of miners, consisting of two equivalents of hydrogen, and one equivalent of carbon, and burning with a pale blue flame. 2. *Olefiant gas,* consisting of two equivalents of hydrogen and two equivalents of carbon. It burns with a very white and luminous flame. 3. *Light gas* or *coal gas,* consisting of a mixture of the preceding in no definite proportions. 4. *Quadricarbureted hydrogen, quadrihydrocarbon,* or *etherin,* consisting of 4 equivalents each of carbon and hydrogen, and produced during the destructive distillation of oil. It burns with a dull fuliginous flame. 5. *Bicarbureted hydrogen,* also obtained by the destructive distillation of oil, and consisting of 3 eq. of hydrogen and 6 eq. of carbon. (See HYDROGEN, CARBURETED HYDROGEN, ETHERIN, NAPHTHA, &c.)

HYDRO-COBALTO-CYANIC ACID. *Prep.* Pass sulphureted hydrogen through a solution of cobalto-cyanide of lead, separate the lead by filtration, evaporate and crystallize. White, fibrous, acidulous, deliquescent crystals, soluble in water. With the metals it forms compounds termed *cobalto-cyanides.* The *cobalto-cyanide of potassium* is formed by gently heating the carbonate, or pure protoxide of cobalt, in a solution of caustic potassa, which has been treated with an excess of hydrocyanic acid, until dissolved, evaporating and crystallizing. It forms soluble, reddish yellow crystals, which are rendered colorless, or only slightly yellow, by recrystallization. The *cobalto-cyanide of lead* is made by treating a solution of acetate of lead with cobalto-cyanide of potassium, and adding ammonia, when a white granular precipitate is formed. *Cobalto-cyanide of silver* is prepared by mixing a solution of nitrate of silver with another of cobalto-cyanide of potassium; a white granular precipitate subsides. In a similar way several other *cobalto-cyanides* may be formed.

HYDROFERRIC ACID. (See FERRIC ACID.)

HYDRO-FERRIDCYANIC ACID. Prepared by decomposing recently precipitated ferridcyanide of lead by sulphureted hydrogen, or by sulphuric acid carefully added. A yellow solution is thus obtained, which yields a deep brown powder when evaporated by heat, or yellow crystals by spontaneous evaporation. With the oxides of the metals it forms ferridcyanides. These may be made by adding a solution of the ferridcyanide of potassium to another of a soluble salt of the base. (See the FERRIDCYANIDE OF POTASSIUM AND IRON.)

HYDROFLUORIC ACID. *Syn.* FLUORIC ACID. STYGIAN WATER. ACIDUM FLUORICUM. ACIDUM HYDROFLUORICUM. AQUA STYGIS. An acid compound of hydrogen and fluorine. It was first procured in a pure state by Gay Lussac and Thénard in 1810.

Prep. Pour concentrated sulphuric acid on half its weight of fluor spar, carefully separated from silicious earth, and reduced to fine powder. The mixture must be made in a capacious *leaden* retort, and a gentle heat applied, when hydrofluoric acid gas will be evolved, and must be collected in a leaden receiver, surrounded with ice.

Props., Uses, &c. A colorless fluid below 59° Fahr., when preserved from the air, but speedily evaporating in dense white fumes when exposed. Its affinity for water exceeds that of sulphuric acid, and its combination with that fluid is accompanied with a hissing noise, and a considerable increase of its sp. gr. up to a certain point. It readily dissolves glass and silica, forming *fluosilicic acid,* for which reason it cannot be preserved in glass vessels. Bottles of lead are hence generally used for this purpose, but silver and platinum are more suitable materials. It is highly corrosive, instantaneously destroying the skin on contact, and producing deep and serious ulcerations; its vapor is pungent, irritating, and irrespirable. With the metals it unites to form *hydrofluorates, fluorates,* or *metallic fluorides. Hydrofluorate of ammonia* is obtained by heating together, over a lamp, 1 part of dry sal ammoniac, with a little more than 2 parts of hydrofluorate of soda, in a platinum crucible, with its lid turned upward, and filled with cold water. The hydrofluorate sublimes and adheres to the lid, forming a mass of small prismatic crystals. It readily acts on glass. The *hydrofluorates of the alkalis, earths, and metals* may mostly be prepared by saturating hydrofluoric acid with the recently precipitated oxide, or carbonate of the base.

In the arts, hydrofluoric acid is used for etching on glass.

HYDROGEN. *Syn.* HYDROGENIUM, (*Lat.*) WASSERSTOFF, (*Ger.*) HYDROGEN, (*Fr.*) INFLAMMABLE AIR. (From ὕδωρ, *water,* and γεννάω, *I generate.*) A chemical element, first correctly described by Cavendish in 1766, having previously been confounded with other gases, and by some called *phlogiston,* from being supposed to be the matter of heat. The term hydrogen was first applied to it by Lavoisier, because it is the radical or base of water. In the pure state it only exists as a gas, and is the lightest substance known. New opinions have lately been promulgated by one of the most celebrated continental chemists respecting hydrogen. At the termination of his fourth lecture at the Sorbonne, M. Dumas announced the following striking views:—"Whatever it may cost me, gentlemen, in thus giving my opinion, I ought to express it fully. We ought no longer to consider hydrogen as a metalloid, or as merely approaching to a metal in any form—it ought to be classed by the side of metals, or among metals. *It is a gaseous metal, even as mercury is a liquid metal.* If we suppose that it is impossible to liquefy the vapor of mercury—that it is colorless, inodorous, and transparent as hydrogen—we shall have a correct idea of the views I wish to establish. By degrees you will learn to appreciate the correctness of this new theory—when, for instance,

you study the different compound bodies of which hydrogen is a constituent. The *ensemble* of its properties approaches, in fact, to mercury and potassium." (Echo du Monde Savant, Nov. 20, 1842.)

Prep. I. Place iron wire in a gun-barrel, or a porcelain tube, open at both ends, to one of which attach a retort containing water, and to the other a bent tube, connected with a pneumatic trough. The gun-barrel must now be heated to redness, and the water in the retort brought into a state of brisk ebullition, when the vapor will be decomposed, the oxygen being absorbed by the iron, and the hydrogen escaping into the gas receiver.

II. Oil of vitriol 1 part; water 5 parts; mix, and pour the dilute acid on iron or zinc wire, or filings placed in a retort or gas bottle. Hydrogen will be evolved as before. This is the more convenient method of the two, and the one usually adopted in practice.

Remarks. To render the gas quite pure, distilled zinc should be employed, and the gas should be passed, first through alcohol, and then through a concentrated solution of pure potassa.

Prop., Uses, &c. A colorless, tasteless, odorless (when pure) combustible gas, having the sp. gr. 0·0694; being 16 times lighter than oxygen gas, and nearly 14½ times lighter than atmospheric air. Combined with oxygen it forms *water;* with chlorine, *muriatic acid;* with iodine, *hydriodic acid;* with bromine, *hydrobromic acid;* with fluorine, *hydrofluoric acid;* with cyanogen, *prussic acid;* with carbon, several *hydrocarburets* or *hydrocarbons;* with nitrogen, *ammonia;* with phosphorus, *phosphoreted hydrogen;* with sulphur, *sulphureted hydrogen;* and with arsenic, tellurium, and potassium, *arseniureted, tellureted,* and *potassiureted hydrogens.* It also enters into the composition of all compounds containing water, (hydrates, &c.,) numerous acids and salts, and the various proximate organic principles both of the animal and vegetable kingdoms. It forms one of the ingredients of coal gas, and of all bodies that possess the power of burning with flame. From its extreme lightness it is used to fill balloons, but its *carburet,* (coal gas,) from being cheaper and more easily procured in large quantities, is generally employed for this purpose. 100 cubic inches, at 60° F., and 30 inches of the barometer, weigh 2·1371 grs. Mixed with atmospheric air or oxygen it explodes with extreme violence on the approach of flame, or sudden compression. (Biot.) When brought into contact with spongy platinum, the latter instantly becomes red hot, and the gas is kindled. A small apparatus, arranged upon this principle, constitutes the popular little instrument for the instantaneous production of light, sold by the philosophical instrument makers. One measure of hydrogen and 5 or 6 of air, or 2 of hydrogen and 1 of oxygen, are the proportions that explode with the greatest violence. (Doebereiner.) A mixture of 1 volume of hydrogen and 9 volumes of air explodes feebly, and one of 4 volumes of hydrogen and 1 volume of air does not explode at all. (Cavendish.) The electric spark, spongy platinum, the black powder of platinum, (Garden,) clean platinum foil, (Faraday,) and some other substances, produce combination, and generally explosion, of the mixed gases. A jet of hydrogen, burnt in oxygen gas, or a jet of these gases (mixed) burnt in the air, with proper precautions, produces the most intense heat known. On this property is formed the oxy-hydrogen blowpipe. This instrument can only be used with safety when furnished with Hemming's safety jet, or other arrangement to prevent an explosion. (See BLOWPIPE.) Prof Daniell's method of fixing a jet of oxygen within another jet of hydrogen, or coal-gas, so that a current of oxygen may be introduced into the middle of the flame, is very safe and convenient. (The figures 1 and 6, at page 122, are wrongly numbered; they should be reversed.)

HYDROGEN, BINOXIDE. *Syn.* DEUTOXIDE OF HYDROGEN. PEROXIDE OF DO. This singular fluid was discovered by M. Thénard in 1818.

Prep. I. Mix deutoxide of barium, with about twice its weight of water, then gradually add sulphuric acid until all the deutoxide is converted into sulphate of baryta, observing to avoid excess of acid.

II. Water 6 or 7 oz.; deutoxide of barium 230 grs.; mix, and add gradually as much pure concentrated hydrochloric acid as is required to render the deutoxide soluble; then place the containing vessel, which should be of glass, in a freezing mixture, or vessel of ice, and add gradually and cautiously 185 grs. of powdered deutoxide of barium, stirring with a glass rod, after each addition; as soon as dissolved, add sulphuric acid to precipitate the whole of the baryta, and then a second portion of 185 grs. of deutoxide of barium, as before. This must also be precipitated with sulphuric acid, the solution filtered, and the same process repeated, until about 3 oz. of deutoxide of barium have been employed. The hydrochloric acid must then be separated by means of sulphate of silver, cautiously added, and the sulphuric acid afterwards separated by pure solid baryta. (Ann. de Chim. et de Phys. and M. Thénard's Traité de Chimie.)

Remarks. The liquid prepared by the last formula contains 25 to 30 times its volume of oxygen, and also much simple water. To remove the latter it must be placed over sulphuric acid, under the exhausted receiver of an air-pump, where it must be kept until the sp. gr. becomes 1·452, beyond which it cannot be concentrated; as at this point it begins itself to volatilize slowly. In this state it is a colorless and limpid fluid, having a metallic taste, and is stable at low temperatures, but resolved into oxygen and water, at 59° F. It mixes with water in all proportions, and becomes more permanent. The same may also be said of the acids. It bleaches organic substances. All the metals, except iron, tin, antimony, and tellurium, decompose it with more or less facility, and this action is promoted by the substances being in a state of minute division. A similar decomposition is produced by many of the metallic oxides. The peroxides of lead, mercury, gold, platinum, manganese, and cobalt, effect this change instantaneously, and accompanied with extreme violence, during which the glass tube holding the liquid becomes red hot. Its action on oxide of silver is also exceedingly violent. Every drop of the liquid let fall on the dry oxide produces a real explosion; and so much heat is evolved, that if the experiment be made in a dark place, there is a very sen-

ble disengagement of light. Gold, in a state of extreme division, acts with great force on pure oxygenated water; yet it has no action on that liquid if it be mixed with a little sulphuric acid. Fibrin, (recently extracted from the blood,) the tissue of the lungs, kidneys, and spleen, and the skin and veins, also deoxydize the liquid.

Peroxide of hydrogen has been applied in the arts to restore the blackened lights of paintings, which have become darkened, from the lead they contain being acted on by the sulphureted hydrogen frequently present in the atmosphere. It has been lately proposed by M. de Sondala, as a means of supplying oxygen to the confined air of diving bells and other limited places; the carbonic acid formed by the lungs being at the same time absorbed by passing the air through hydrate of lime.

HYDROLEIC ACID. A peculiar compound obtained by evaporating the alcohol used in the preparation of hydromargaritic acid.

HYDROMARGARIC ACID. A compound formed by melting together one equivalent each of meta-margaric and hydromargaritic acids, and crystallizing the mass from alcohol.

HYDROMARGARITIC ACID. Obtained by boiling the mother liquor of meta-margaric and metoleic acids, when a mixture of hydromargaritic and hydroleic acids rises to the surface, which, after being washed with *cold* alcohol, leaves the former pure. By heat it is converted into meta-margaric acid and water. Soluble in alcohol and ether.

HYDROMELLONIC ACID. Prepared by dissolving mellonide of potassium in boiling water, adding muriatic, sulphuric, or nitric acid, and collecting and drying the precipitate. A yellow powder, soluble in water. It forms *mellonides* with the metallic oxides.

HYDROMEL. *Prep.* (P. Cod.) Honey 2 oz.; boiling water 32 oz.; dissolve and strain.

HYDROMETER. (From *ὕδωρ*, *water*, and *μέτρον*, *a measure*.) An instrument for ascertaining the specific gravities of liquids, and hence their strengths; these being either in inverse or direct proportion to their specific gravities. Spirituous liquors and ammonia water are examples of the *former*, and malt wort, and sirups of the latter. The hydrometer employed by the revenue officers for levying the duties on spirits has been already described at pages 35 and 36.

Baume's hydrometer or *areometer* is very generally employed on the continent for ascertaining the specific gravities of various liquids. As now made, it either consists of a *single* spindle about 18 inches long, graduated from —80° to +80°, or of *two spindles* of about half that length; the one for light liquids ranging from 10° to 80°, and the other for heavy liquids ranging from 0° to 80°. These are employed with a long glass tube, in a similar way to Sike's hydrometer before noticed, but the thermometer for ascertaining the temperature must be covered with a glass case, or arranged with a folding scale to allow of its immersion in corrosive liquids.

In Baume's hydrometer for liquids lighter than water, the instrument is poised, so that the 0 of the scale is at the bottom of the stem, when it is floating in a solution of 1 oz. of common salt in 9 oz. of water, and the depth to which it sinks in distilled water shows the 10th°; the space between these fixed points being equally divided. His graduation was continued upwards to the 50th°, but is now continued further.

Corresponding Degrees of Baume's Hydrometer and real Specific Gravities.—I. Hydrometer for LIGHT FLUIDS, or Pese-Esprit. Temperature 56 to 60° Fahr.

Baume.	Spec. Gra.	Baume.	Spec. Gra.
50	0·782	29	0·884
49	0·787	28	0·889
48	0·792	27	0·895
47	0·796	26	0·900
46	0·800	25	0·906
45	0·805	24	0·911
44	0·810	23	0·917
43	0·814	22	0·923
42	0·819	21	0·929
41	0·823	20	0·935
40	0·828	19	0·941
39	0·832	18	0·948
38	0·837	17	0·954
37	0·842	16	0·961
36	0·847	15	0·967
35	0·852	14	0·974
34	0·858	13	0·980
33	0·863	12	0·987
32	0·868	11	0·993
31	0·873	10	1·000
30	0·878	0	1·075

In the hydrometer for liquids heavier than water, the position of the fixed points is reversed; for the 0 is at the top of the stem, and denotes the level to which the hydrometer sinks in distilled water: the 10th° is lower down, and shows the level to which it sinks in the saline solution, and the graduation was continued downwards to the 75th°, but is now continued further.

Corresponding Degrees of Baume's Hydrometer and real Specific Gravities.—II. Hydrometer for HEAVY FLUIDS, or Pese-Acid. Temperature 56 to 60° Fahr.

Baume	Spec. Gra.	Baume.	Spec. Gra.
1	1·007	23	1·190
2	1·014	24	1·199
3	1·022	25	1·210
4	1·029	26	1·221
5	1·036	27	1·231
6	1·044	28	1·242
7	1·052	29	1·252
8	1·060	30	1·261
9	1·067	31	1·275
10	1·075	32	1·286
11	1·083	33	1·298
12	1·091	34	1·309
13	1·100	35	1·321
14	1·108	36	1·334
15	1·116	37	1·346
16	1·125	38	1·359
17	1·134	39	1·372
18	1·143	40	1·384
19	1·152	41	1·398
20	1·161	42	1·412
21	1·171	43	1·426
22	1·180	44	1·440

Baume.	Spec. Gra.	Baume.	Spec. Gra.
45 .	. 1·454	61 .	. 1·736
46 .	. 1·470	62 .	. 1·758
47 .	. 1.485	63 .	. 1·779
48 .	. 1.501	64 .	. 1·801
49 .	. 1.516	65 .	. 1·823
50 .	. 1.532	66 .	. 1·847
51 .	. 1.549	67 .	. 1·872
52 .	. 1·566	68 .	. 1·897
53 .	. 1·583	69 .	. 1·921
54 .	. 1·601	70 .	. 1·946
55 .	. 1·618	71 .	1·974
56 .	. 1·637	72 .	. 2·002
57 .	. 1·656	73 .	. 2·031
58 .	. 1·676	74 .	. 2·059
59 .	. 1·695	75 .	. 2·087
60 .	. 1·714		

The *areometers* and *alcoholometers* of Gay Lussac, Tralles, and Richter, at once indicate on their stems the strength of the liquid, which merely requires correction as to temperature. (See page 37.)

The *hydrometer of Fahrenheit* consists of a hollow ball, with a counterpoise below, and a very slender stem above, terminating in a small dish. The middle, or half length of the stem, is distinguished by a fine line across. In this instrument every division of the stem is rejected, and it is immersed in all experiments to the middle of the stem, by placing proper weights in the little dish above. Then as the part immersed is constantly of the same magnitude, and the whole weight of the hydrometer is known, this last weight, added to the weights in the dish, will be equal to the weight of fluid displaced by the instrument, as all writers on hydrostatics prove. And accordingly, the sp. gravities for the common form of the tables will be had by the proportion:—

As the whole weight of the hydrometer and its load, when adjusted in distilled water: is to the number 1000, &c.: : so is the whole weight when adjusted in any other fluid : to the number expressing its specific gravity.

Nicholson's hydrometer for taking the sp. gr. of minerals, is a very convenient instrument.

Twaddell's hydrometer is much used in the bleaching establishments of Scotland and some parts of England. According to this scale 0 is equal to 1000, or the sp. gr. of distilled water, and each degree is equal to ·005, so that by multiplying this number by the number of degrees marked on the scale, and adding 1· the real specific gravity is obtained.

Table of Specific Gravities indicated by Twaddell's Scale.

Twaddell.	Sp. Gr.	Twaddell.	Sp. Gr.
0	1000	100	1500
10	1050	110	1550
20	1100	120	1600
30	1150	130	1650
40	1200	140	1700
50	1250	150	1750
60	1300	160	1800
70	1350	170	1850
80	1400	180	1900
90	1450	190	1950

Hydrometers, unless manufactured with great care and skill, merely afford approximate results, but which are nevertheless sufficiently correct for all ordinary purposes. They also require several ounces of liquor to float them, and hence cannot be used for small quantities of liquid. (See Specific Gravity.)

HYDRO-PERSULPHOCYANIC ACID. A yellow reddish crystalline mass, obtained by fusing sulphocyanide of potassium in a stream of dry muriatic acid gas, in a vessel connected with a suitable receiver. It is purified by a solution in hot alcohol, which deposites it on cooling in a semi-crystalline form.

HYDROPHOBIA, CURE FOR. At Udina, in Friule, a poor man lying under the frightful tortures of hydrophobia was cured with some draughts of vinegar, given him by mistake, instead of another potion. A physician at Padua got intelligence of this event at Udina, and tried the same remedy upon the patient in the hospital, administering to him a pound of vinegar in the morning, another at noon, and a third at sunset, and the man was speedily and perfectly cured.

HYDRO-SULPHOCYANIC ACID. A peculiar acid occurring in the seeds and blossoms of the cruciferæ, and in the saliva of man and sheep. It may be obtained by decomposing sulphocyanide of lead by dilute sulphuric acid, avoiding excess, and throwing down the last portion of lead by sulphureted hydrogen. It may also be prepared by decomposing a mixture of 1 part of sulphocyanide of silver and 100 of water, by sulphureted hydrogen. It forms a colorless fluid, readily undergoing decomposition by the action of air and heat. With the bases it forms compounds termed *sulphocyanides*, most of which may be formed by saturating the acid with the oxide, or hydrate of the base, or from the sulphocyanide of potassium, and a soluble salt of the base, by double decomposition.—*Sulphocyanide of potassium* is formed by drying prussiate of potash to expel its water, powdering, adding ½ its weight of sulphur, and fusing in an iron vessel at a low red heat, until the escaping bubbles of gas inflame in the air, and burn with a red light; the mass must be then cooled, dissolved in boiling water, treated with a solution of carbonate of potassa until it ceases to become turbid, next boiled for a quarter of an hour, filtered, evaporated, and crystallized. The crystals must be redissolved in alcohol, and the solution refiltered and recrystallized. Forms colorless, deliquescent, prismatic crystals, soluble in alcohol and water.—*Sulphocyanide of lead* is prepared by mixing concentrated solutions of acetate of lead and sulphocyanide of potassium. Lustrous yellow opaque crystals, decomposed by boiling water, into hydrosulphocyanic acid and a basic salt. If subacetate of lead be used instead of the acetate in the above formula, a basic sulphocyanide of lead will be formed.—*Sulphocyanide of copper* is prepared by precipitating a mixture of sulphate of copper and sulphocyanide of potassium with a solution of protosulphate of iron. An insoluble granular powder. —*Sulphocyanide of silver* is formed by precipitating neutral nitrate of silver by sulphocyanide of potassium. White, insoluble. By solution in ammonia it may be obtained in brilliant crystalline white plates.

HYDROTELLURIC ACID. A peculiar gaseous body discovered by Davy in 1809, and

formed in a similar manner to hydrogen by digesting muriatic acid on an alloy of tellurium with zinc or iron. It possesses feeble acid properties, and precipitates *tellurets* from metallic solutions. It is absorbed by water, and then forms liquid *hydrotelluric acid*, or *telluretted hydrogen*.

HYDROUS. Containing chemically combined water. (See HYDRATE.)

HYDROXANTHIC ACID. The name originally given by Zeise to xanthic acid.

HYDRURET. *Syn.* HYDROGURET. HYDRURETUM, (*Lat.*) A compound of hydrogen with a metal.

HYGRUSIN. A name given by Bizio to the éleoptène of Berzelius, or the liquid and more volatile portion of essential oils.

HYOSCYAMIA. *Syn.* HYOSCYAMINUM. HYOSCYAMINE. HYOSCYAMA. HYOSCYAMINA. An alkaloid discovered by Brande in common henbane, (hyoscyamus nigra.) It is powerfully narcotic. Chevallier, Brault, and Poggiale, eminent and skilful chemists, have failed to procure it. (Jour. de Pharm.) It may be obtained in prisms, and with the acids forms salts.

HYPNOTICS. (From ὕπνος, *sleep*.) Medicines that induce sleep. Opium, morphia, and henbane, are the principal hypnotics. (See ANODYNE.)

HYPOCHLOROUS ACID. *Syn.* EUCHLORINE. A gaseous compound, discovered by Davy in 1811. It is most conveniently prepared by agitating together a mixture of 1 part of peroxide of mercury and 2 parts of water, in a bottle filled with chlorine gas. The filtered liquid is fluid hypochlorous acid. It may be purified by distillation at a temperature considerably below 212°, as at that heat it suffers rapid decomposition. It bleaches powerfully, and is readily decomposed by light and contact with various substances, especially powdered glass or angular bodies. The compounds popularly called *chloride of lime, soda*, and *potash*, are supposed by some to be *hypochlorites*, but the point is undetermined.

HYPOCHONDRIASIS. (From ὑποχονδριακος, *one who is hipped*.) The vapors, lowness of spirits, blue devils. This disease chiefly affects persons of the melancholic temperament, and is commonly induced by hard study, irregular habits of life, want of proper social intercourse, and exercise. The treatment may in most cases be similar to that mentioned under *dyspepsia*, observing, however, that success depends more on amusing and engaging the mind, and in gradually weaning it from old conceits, than in the mere administration of medicine. When the patient is tormented with a visionary or exaggerated sense of pain, or of some concealed disease, or a whimsical dislike of certain persons, places, or things, or groundless apprehensions of personal danger or poverty, or the conviction of having experienced some dreadful accident or misfortune, the better way is to avoid any direct attempts to alter his opinions, but to endeavor to inspire confidence in some method of relief. Greding mentions the case of a medical man who conceived that his stomach was full of frogs, which had been successively spawning ever since he had bathed, when a boy, in a pool in which he had perceived some tadpoles; and he had spent his life in endeavoring to get them removed. Another patient perhaps conceives himself to be a giant; a second as heavy as lead; a third a feather, in continual danger of being blown away by the wind; and a fourth a piece of glass, and is hourly fearful of being broken. Marcellus Dentatus mentions a baker of Ferrara, who thought himself a lump of butter, and durst not sit in the sun, or come near the fire, for fear of being melted. The writer of this article once knew a man who always put on his coat the wrong side in front, because he conceived his face looked behind him. In such cases it is useless to argue with the patient, as it only causes irritation, and increases the malady.

HYPONITROUS ACID. A highly volatile liquid, gaseous at common temperatures, first obtained by Gay Lussac, by confining a mixture of binoxide of nitrogen in excess and oxygen gas, in a glass tube over a concentrated solution of pure potassa, in the mercurial pneumatic trough. It may also be obtained from a mixture of 200 measures of binoxide of nitrogen and 50 measures of oxygen, both quite dry, by exposing the resulting orange fumes to intense cold, which condenses them into a liquid. When 10 parts of nitric acid sp. gr. 1·3 are poured on 1 part of starch in a capacious retort, and a gentle heat applied by means of a water-bath, "pure hyponitrous acid is disengaged." (Liebig and Gregory, Turner's Chem., 7th ed. p. 848.) At 0° F., hyponitrous acid is a colorless liquid, but green at higher temperatures, rapidly volatilizing in orange-colored vapors. It is decomposed by contact with water and the bases, but the earthy and alkaline *hyponitrates* may be indirectly formed by exposing the corresponding nitrates to a gentle red heat.

HYPO-PHOSPHOROUS ACID. A peculiar viscid liquid discovered by Dulong in 1816, and obtained by treating phosphuret of barium with water, and as soon as the phosphureted hydrogen has escaped, filtering, throwing down the baryta with dilute sulphuric acid, again filtering and evaporating. It is a powerful deoxidizing agent, and forms salts with the bases called *hypophosphites*. The hypophosphites of the alkalis may be prepared by precipitating an earthy hypophosphite by an alkaline carbonate, or by directly neutralizing the acid with those carbonates. The *earthy hypophosphites* may be formed by boiling the earths in a caustic state along with water and a few fragments of phosphorus, filtering, and evaporating. All the hypophosphites are soluble in water, and those of the alkalis, both in alcohol and water; they are all decomposed by heat.

HYPOSULPHOBENZIDIC ACID. A sour liquid, or crystals, obtained by decomposing hyposulphobenzidate of copper by sulphureted hydrogen. It forms salts with the bases termed *hyposulphobenzidates*. The salt of baryta may be formed by saturating fuming oil of vitriol with benzole, adding water, filtering, neutralizing the liquid with carbonate of baryta, again filtering, evaporating, and crystallizing. *Hyposulphobenzidate of copper* may be obtained by precipitating the last salt with sulphate of copper, filtering, evaporating, and crystallizing.

HYPOSULPHOBENZOIC ACID. *Syn.* SULPHOBENZOIC ACID. *Prep.* Accurately precipitate a solution of acid hyposulphobenzoate of baryta with sulphuric acid, filter, evaporate first over

the open fire, and then in vacuo over sulphuric acid. Crystalline, deliquescent, sour; forming salts called *hyposulphobenzates* or *sulphobenzates*. The *acid* salt of baryta may be made by conducting the vapors of anhydrous sulphuric acid into a dry receiver, containing crystals of benzoic acid, and placed in a freezing mixture. As soon as a translucent mass is formed, dissolve it in water, decant the clear, neutralize with carbonate of baryta, evaporate, and add some muriatic acid, when crystals will form as the solution cools. It may be decolored by animal charcoal, and purified from muriatic acid by repeated re-solutions.

HYPOSULPHO-INDIGOIC ACID. A name given by Berzelius to one of the acids obtained by precipitating sulphate of indigo with carbonate of potassa.

HYPOSULPHURIC ACID. An acid compound of sulphur and oxygen, discovered by Welter and Gay Lussac. It is prepared by passing sulphurous acid gas through water, holding in suspension black oxide of manganese, in fine powder. The manganese is then precipitated by baryta in excess, and a current of carbonic acid is passed through the liquid, which is next filtered and evaporated, when crystals of hyposulphate of baryta will be obtained. These, when dissolved, and carefully neutralized with sulphuric acid, will yield a solution of hyposulphuric acid. It may be concentrated until its sp. gr. becomes 1·35. It neutralizes the alkalis and earths, forming salts called *hyposulphates*, which are soluble.

HYPOSULPHITE OF SODA. *Prep.* (*Capaun's process.*) Boil a dilute solution of caustic soda with sulphur until saturated. Then pass sulphurous acid gas into the solution until there remains but a very small portion of $Na\,S^5$ undecomposed. This may be ascertained by filtering a small portion of the solution, which ought to have a very pale yellow color. If this is found to be the case, the whole of the solution is filtered and evaporated by boiling to a sirupy consistence. The ambient air, during evaporation, acts upon the $Na\,S^5$ which remains in the liquor, and converts it into hyposulphite soda. This last-mentioned salt crystallizes from the sirupy solution. When the salt is dry, it is unalterable in the air. If there still remains some sulphuret of soda in the sirup, with a view to its removal, it is simply necessary to mix it with one half of its weight of alcohol, and shake it well. The alcohol takes up the sulphuret of soda, and swims on the surface of the aqueous solution, which latter is set aside to crystallize, without removing the supernatant alcoholic layer.

"It appears to me that it would be more advantageous to modify this operation in such a manner as to procure the bisulphite by saturating a solution of carbonate of soda with sulphurous acid gas, disengaged from bruised charcoal by sulphuric acid. Then mix with this solution (of bisulphite soda) the sulphuret of sodium, prepared in the moist way above mentioned, in slight excess; filter, evaporate, and set aside to crystallize." (Berzelius.)

HYPOSULPHUROUS ACID. The *hyposulphites*, or salts formed by the union of this acid with the bases, may either be obtained by digesting sulphur in solutions of the sulphites, or by passing the sulphurous acid gas into alkaline solutions. The *hyposulphites* of potassa and soda possess the remarkable property of dissolving a large quantity of chloride of silver, and some other metallic compounds, hence their use in the art of photography.

HYSTERICS. *Syn.* Hysteria, (from ὑστέρα, *the womb.*) The treatment of this disease varies with the causes and the symptoms. Bleeding and depletives are generally had recourse to in robust and plethoric habits, and stimulants and tonics in those of a weakly or relaxed constitution. Affusion of cold water, and nasal stimulants, will frequently remove the fit, in mild cases. Exercise, proper amusements, and regular hours and diet, are the best preventives. (See Antihysteric Draught.)

IGASURIC ACID. *Syn.* Acidum Igasuricum. An acid discovered by Pelletier and Caventou, associated with strychnine in the faba santa ignatii and nux vomica. It may be obtained by digesting the rasped or ground beans first in ether, and then in boiling alcohol, evaporating the latter decoction to dryness, diffusing the residuum through water, adding a little carbonate of magnesia, again boiling for some minutes, filtering, washing the powder with cold water, again digesting it in alcohol, and filtering. The *igasurate of magnesia* thus obtained is then dissolved in boiling water, the solution decomposed by acetate of lead, and the precipitate, (*igasurate of lead,*) after being washed and diffused through distilled water, is decomposed by sulphureted hydrogen. The solution thus obtained yields crystals on being evaporated.

IMPERATORINE. A neutral, fusible, and acrid-tasted substance, extracted by means of ether from the roots of imperatoria ostrutium. It is insoluble in water.

IMPERIAL. *Syn.* Imperial Drink. Potus imperialis. *Prep.* I. Cream of tartar ½ oz.; fresh orange or lemon-peel 3 oz.; lump sugar 4 oz.; boiling water 3 pints; digest in a close vessel until cold, then pour off the clear.

II. (Collier.) To the last add cream of tartar ½ oz., and sweeten to palate. Refrigerant; a common drink in fevers, and in hot weather.

INDIAN RUBBER BLACKING. *Prep.* I. (*Bryant and James's paste.*) Ivory black 60 lbs.; treacle 45 lbs.; good vinegar and oil of vitriol, of each 12 lbs.; Indian rubber oil 9 lbs.; mix.

II. (*Bryant and James's liquid.*) Ivory black 60 lbs.; treacle 45 lbs.; gum (dissolved) 1 lb.; vinegar (No. 24) 20 gallons; oil of vitriol 24 lbs.; Indian rubber oil 9 lbs.; mix.

Remarks. The Indian rubber oil is made of caoutchouc 18 oz., dissolved in rape oil 9 lbs. by means of heat. The ingredients are mixed together in the same order and manner as common blacking.

INDIGESTION, (POPULAR REMEDIES FOR.) *Prep.* I. (*Abernethy's pills.*) Calomel and oxysulphuret of antimony, of each 20 grs.; powdered gum guaiacum 40 grs.; Castile soap q. s., (about 25 grs.;) beat into a mass, and divide into 20 pills. *Dose.* 1 or 2 night and morning occasionally.

II. (*Dr. Babington's mixture.*) Infusion of calumba 6 oz.; carbonate of potassa 1 dr.; compound tincture of gentian 3 dr.; mix. *Dose.* 2 or 3 tablespoonfuls daily at noon.

III. (*Dr. Bailey's mixture.*) Epsom salts 3 dr.; infusion of roses ½ pint; tincture of cascarilla ½ oz. *Dose.* 2 or 3 tablespoonfuls at noon and in the evening.

IV. (*Dr. Gregory's mixture.*) Carbonate of potassa ½ oz.; cinnamon water and distilled water, of each 6 oz.; compound tincture of gentian 1 oz.; mix. *Dose.* As last.

V. (Dr. J. Hutchinson.) Quicklime ½ oz., slaked, by sprinkling on it a *little* water, and when it has fallen to powder, add water 1½ pint, and bruised cinchona bark 1 oz.; macerate with occasional agitation for 3 hours, in a covered vessel, then decant the clear liquor, and further add tincture of cinchona bark 2 oz.; sweet spirits of nitre 3 drs.; sirup of orange-peel 1 oz.; mix well, and keep it in a corked bottle. *Dose.* A wineglassful 2 or 3 times a day, accompanying its use with an occasional dose of a saline aperient. "Such were the renovating effects of this medicine on me, that it may with truth be denominated the true *aqua vitæ;* for it laid the foundation of a state of health and strength which has seldom been surpassed." (Sir J. Jervis, Bart.)

VI. (*Dr. Reece's mixture.*) Carbonate of soda 1 dr.; compound tincture of rhatany 1 oz.; tinctures of ginger and chamomiles, of each 3 dr.; camphor julep 7 oz.; mix. *Dose.* 3 tablespoonfuls twice a day. (See DYSPEPSIA.)

INDIGO. *Syn.* ANIL. BLEU D'INDE; INDIGO, (*Fr.*) INDICUM; PIGMENTUM INDICUM, (*Lat.*) Ἰνδικόν, (*Gr.*) A blue substance obtained from the leaves and young shoots of several species of indigofera and nerium, by soaking them either in cold water, or, still better, in water kept warm, and at about 106° Fahr., till the liquor becomes deep green; it is then drawn off, and beat or churned till blue flakes appear, lime-water is next added, the yellow liquor drawn off, the blue sediment dried, and formed into small lumps. Used as a blue dye and pigment, and occasionally in medicine for epilepsy.

Indigo, though apparently a very simple substance, is composed of several distinct principles, and by the action of acids, alkalis, oxygen, chlorine, &c., yields other substances possessing considerable interest. The following are the chief of these compounds, of which the word indigo constitutes a portion of the name:—

Pure indigo, or *indigo blue.* I. Powdered indigo 5 parts; green vitriol 10 parts; hydrate of lime 15 parts; water 60 parts; mix, agitate occasionally until the color is destroyed, then decant the clear portion, precipitate with hydrochloric acid, and wash the powder, first with water, and then with boiling alcohol, until the latter ceases to acquire a yellow color.

II. Caustic soda and grape sugar, of each 1 part; water 20 parts; powdered indigo 5 parts; mix, and proceed as above.

III. (Thos. Taylor.) Powdered indigo 2 parts; plaster of Paris 1 part; water, sufficient to reduce the mixture to a thin paste; spread the mass evenly upon an oblong iron plate to the depth of ⅛ inch, and dry it by a gentle heat. It must then be held over the flame of a spirit lamp, when a disgusting odor will be evolved, the mass will begin to smoke, and in a few minutes will be covered with a dense purple vapor, which will condense into brilliant flattened prisms or plates of an intense copper color, forming a thick velvety coating over the surface immediately exposed to the heat; should the mass catch fire, it may instantly be extinguished by a drop of water let fall upon it. *Prod.* 15 to 18§.

IV. (Fritsche.) Indigo and grape sugar, of each 1 part; put them into a bottle capable of holding 40 parts of liquid; half fill the bottle with boiling alcohol, and the other half with alcohol holding 1½ part of a very concentrated lye of caustic soda in solution, agitate well, and, after repose, decant the clear. The liquid thus obtained possesses an intense yellowish red color, but quickly passes, by exposure to the air, through the various shades of red, violet, and blue, at the same time depositing indigo blue, in scales. These must be well washed, first in alcohol, and lastly in water. *Product.* More than 50§ of the indigo employed. This offers the easiest and most correct means of testing commercial indigo, and is well calculated, from its simplicity, for the use of dyers.

Indigogen, indigotine, indigo white, or *reduced indigo. Prep.* The yellow alkaline solution obtained by one of the above processes is carefully protected from the air, both before and after precipitation with muriatic acid; and the precipitate, after being rapidly washed with recently boiled distilled water, or with dilute sulphurous acid, is drained on a filter, and dried *in vacuo.* The product consists of a grayish mass of minute crystals, generally light-blue on the surface, and rapidly turning blue on exposure to the air. *White indigo* is soluble in alkalis, alcohol, and ether, to which it imparts a yellow color. These solutions deposite indigo blue on exposure to the air.

Indigo gluten is obtained by the action of dilute acids on indigo. It possesses little interest.

Indigo brown is obtained from powdered indigo by treating it first with dilute acid, and then with a hot strong caustic lye, which must afterwards be neutralized with acetic acid, evaporated to dryness, and treated with alcohol, to dissolve out acetate of potassa. A dark brown substance resembling humic acid.

Indigo red is obtained by boiling alcohol on powdered indigo exhausted of the two previous substances, by dilute acids and strong alkaline lyes. When heated, indigo red is converted into a white sublimate, (deoxydized indigo red,) but recovers its color by the action of nitric acid. This substance has also been called the RED RESIN OF INDIGO.

Indigo purple or phenecine, the purple precipitate obtained by filtration from a solution of indigo in fuming sulphuric acid, when largely diluted with water.

INDIGO DYES. There are two methods of preparing solutions of indigo for dyeing. 1. By deoxydizing it and dissolving it in alkaline menstrua. 2. By dissolving it in sulphuric acid. The former constitutes the ordinary *indigo vat* of the dyers.

Prep. I. *a.* (*Cold vat.*) Finely-powdered indigo 1 lb.; green copperas (as free as possible from red oxide) 2½ to 3 lbs.; newly-slaked quicklime 3½ to 4 lbs.; triturate the powdered indigo with a little water or an alkaline lye, then mix it

with some hot water, add the lime, again well mix, after which pour in the solution of copperas, and agitate thoroughly. A little potash or soda is frequently added, and a corresponding portion of lime omitted. For use, a portion of this *preparation vat* is ladled into the dyeing vat, as wanted. After using for some time the vat must be refreshed with a little copperas and fresh-slaked lime, when the sediment must be well stirred up, and the whole mixed together.

b. (*Potash vat.*) Indigo, in fine powder, 12 lbs.; madder 8 lbs.; bran 9 lbs.; potash 24 lbs.; water at 125° F. 120 cubic feet; mix well; at the end of 36 hours add 14 lbs. more potash, and after 10 or 12 hours longer, further add 10 lbs. of potash, rouse well, and as soon as the fermentation and reduction of the indigo are well developed, which generally takes place in about 72 hours, add a little freshly-slaked quicklime. This vat dyes very quickly, and the goods lose less of their color in alkaline and soapy solutions than when dyed in the common vat.

Remarks. Wool, silk, linen, and cotton, may all be dyed in the indigo vat by passing them through a weak alkaline solution, and then through the indigo vat for about fifteen minutes; the stuff should be exposed to the air, and the immersion in the vat and exposure repeated till the color becomes sufficiently deep. The addition of a little woad and madder to the vat improves the dye. Other deoxydizing substances, beside those above mentioned, may be used to effect the deoxydation of the indigo; thus a mixture of caustic soda, grape sugar, indigo, and water, is often employed on the Continent for this purpose, and orpiment, lime, and pearlash are also occasionally used. When properly prepared, the indigo vat may be kept in action for several months by the addition of one or other of its constituents, as required. An excess of either copperas or lime should be avoided.

II. Dissolve indigo 1 lb. in smoking sulphuric acid 4½ lbs., or oil of vitriol 7 or 8 lbs., in the way directed under liquid blue, page 122, and, after standing 48 hours, add water 2 gallons. This liquid is added to water as required, and the cloth, previously boiled with alum, is immersed in it, and the boiling and immersion are repeated until the wool becomes sufficiently dyed.

Remarks. With the above dye every shade of blue may be dyed, but it is most commonly employed to give a ground to logwood blues; in which case the stuff is usually prepared by a boil with a mixed mordant of alum, tartar, the sulphates of copper and iron, and the blue solution, and then dyed in a logwood bath, to which a little potash has been added. When the above sulphuric solution of indigo is diffused through water, at a boiling temperature, and wool plunged therein, and allowed to remain as it cools for 24 hours, and then taken out, drained, washed in water until the latter ceases to be colored, and then boiled for about 15 minutes in water containing 1 or 2§ of carbonate of potassa, soda, or ammonia, or a weight equal to about ⅓ of the indigo employed, the blue color will forsake the wool, and become dissolved in the water. This liquid, when *slightly* acidulated with sulphuric acid, imparts a fine blue to cloth. The names *soluble blue, distilled blue, blue carmine, &c., &c.*, have been applied to it; it is in reality a cæruleo-sulphate of potassa, or a double sulphate of indigo and potassa. It may be purified by evaporation to a sirup, and agitation, first with alcohol, and then with a mixture of alcohol and acetic acid; it may then be evaporated to dryness, when it forms a dark blue powder.

INDIGOIC ACID. *Syn.* ANILIC ACID. An acid obtained by Chevreul by the action of dilute boiling nitric acid on indigo. It is prepared by gradually adding indigo in powder to boiling nitric acid, previously diluted with 12 or 15 parts of water, as long as effervescence ensues; a little water being dropped in from time to time to prevent the formation of carbazotic acid. The clear yellow liquid is then decanted while hot, and the crystals deposited as it cools, redissolved in boiling water, and acetate of lead added as long as it causes a brown precipitate. The filtered liquor deposites crystals of anilate of lead on cooling, which by resolution in boiling water, and decomposition with sulphuric acid, yield crystals of anilic acid. Colorless, fusible, yellowish white needles, scarcely soluble in *cold* water, but freely soluble in *boiling* water. It forms soluble and crystallizable salts, called ANILATES or INDIGOTATES, with some of the bases.

INFANT'S PRESERVATIVE, (ATKINSON'S.) *Prep.* Bicarbonate of magnesia ʒvj; white sugar ℥ij; oil of aniseed 20 drops; compound spirit of ammonia ʒiiss; laudanum ʒj; sirup of saffron ℥j; caraway water q. s. to make the whole measure 1 pint. (Haggard.)

INFUSION. *Syn.* INFUSION, (*Fr.*) INFUSUM; INFUSIO, (*Lat.*, from *infundo*, to pour in.) In PHARMACY, a liquid preparation obtained by pouring water of any required temperature upon vegetable or animal substances, and suffering it to stand a certain time. Shavings, leaves, and flowers, require no previous preparation; but roots, woods, and other solid substances must be bruised or sliced, if in the green or recent state, or bruised, or coarsely pulverized, if dry, for the purpose of exposing as large a surface as possible to the action of the menstruum.

The substances extracted by water from vegetables by infusion are chiefly gum, mucus, extractive, tannin, certain vegetable acids, the bitter and narcotic principles, gum-resin, essential oil, and alkalis. Some of these substances are only sparingly soluble in water at ordinary temperatures; but more readily so in *hot* water, and freely soluble in *boiling water*. The temperature of the water should be therefore proportioned to the nature of the vegetable matter operated on. For mere demulcent infusions, in which fecula and gum are the chief substances sought to be dissolved out, and when the active principle is scarcely soluble in water, unless nearly at the boiling temperature, boiling water alone should be employed; but when the medicinal virtues of vegetables are soluble in water at lower temperatures, it is better to employ *hot* water, and to allow a little longer period for the digestion. In many cases temperate water, (from 60 to 70°,) or tepid water, (from 80 to 90°,) may be used with advantage, especially in the preparation of aromatic bitter infusions, and in most cases, where it

is wished that the product should contain as little inert matter as possible; but when water at low temperatures is employed, the period of the maceration must be proportionately increased. By adopting the method of *maceration in vacuo*, the menstruum may be allowed to lie in contact with the vegetable matter for an unlimited period, without decomposition taking place.

Infusions, like decoctions, are liable to undergo spontaneous decomposition by keeping, especially in warm weather, when a few hours are often sufficient for their passage into a state of active fermentation; they should therefore be prepared for use daily, as beyond 24 hours they cannot be depended on. The London College directs a pint only to be made at a time, thus very properly regarding them as extemporaneous preparations. See Decoctions.

*** As many infusions which are occasionally employed in medicine must necessarily escape notice in the following list, it may be as well to remark, that the Infusions of all vegetables that do not exert a *very powerful* action on the human frame, may be made by pouring 1 pint of boiling water on 1 oz. of the vegetable matter, and allowing it to macerate for half an hour to an hour; and the Decoctions of the same vegetables may be made by boiling the above ingredients in the same proportions for 10 or 15 minutes, instead of operating by mere infusion. *The ordinary dose* of such infusions and decoctions is 1 to 2 oz. three or four times a day.

INFUSION, ANTISCORBUTIC. *Syn.* Infusum antiscorbuticum. *Prep.* (E. H.) Water trefoil (menyanthes aquaticum) ℥ij; orange ℥ss; boiling water 4 pints; infuse for a night, strain, and add compound spirits of horseradish half a pint.

INFUSIONS, ASTRINGENT. *Syn.* Inf. astringens. *Prep.* I. Oak bark ℥ss; boiling water ½ pint; infuse 1 hour, and to each ℥iss of the strained liquor add powdered galls 10 grs.; tincture of catechu, compound tincture of cardamoms, and sirup of orange peel, of each ʒss, for a dose.

II. Infusion of cusparia ℥j; tincture of catechu or kino ʒj; powdered ipecacuanha 3 grs.; powdered opium ½ a gr.; mix for a dose. In diarrhœa, &c.

INFUSION, BITTER PURGING. *Syn.* Inf. amarum purgans (P. L. 1746.) The same as compound gentian mixture.

INFUSION, CATHARTIC. *Syn.* Inf. catharticum. *Prep.* I. Infusion of senna ℥j; tinctures of senna and jalap, tartrate of potassa, and sirup of senna, of each ʒj; mix, for a dose.

II. Infusion of senna ℥iss; Epsom salts ʒvj; tinctures of jalap and castor, of each ʒj; laudanum and tincture of ginger, of each 10 drops; mix, for 1 dose.

III. Infusion of senna ℥ij; potassio-tartrate of soda ʒvj; cinnamon water ℥ss; mix, for 2 doses.

IV. Senna leaves ½ oz.; Glauber salts 2 oz.; boiling water ½ pint; macerate for 2 hours, strain, and add tincture of ginger ¼ oz.; compound tincture of cardamoms 1 oz.; for 4 doses.

INFUSION, CEPHALIC. *Syn.* Inf. cephalicum. *Prep.* (E. H.) Valerian root ℥ij; rosemary ʒiv; boiling water 1 quart; infuse 12 hours, strain, and add aromatic water ℥iv. *Dose.* A wineglassful 3 or 4 times a day, as antispasmodic, and in various affections of the head.

INFUSION, DIURETIC. *Syn.* Inf. diureticum. *Prep.* I. Broom tops ℥ij; boiling water ℥xvj; infuse 1 hour, strain, cool, and add sweet spirits of nitre ʒiv. *Dose.* ℥j every other hour.

II. Infusion of foxglove ℥iv; tincture of foxglove ʒss; acetate of potassa ʒj; laudanum 10 drops. *Dose.* 1 tablespoonful twice or thrice a day.

III. Juniper berries ℥ij; aniseed ʒij; boiling water lb. j; infuse 1 hour; strain, and when cold, add compound spirit of juniper ℥ij; tincture of squills and nitre, of each ʒj. *Dose.* ½ a teacupful frequently. All the above are common diuretics in dropsies.

INFUSION OF ALOES. *Syn.* Inf. Aloes. *Prep.* Socotrine or hepatic aloes, bruised, ʒiv; boiling water 1 pint; digest with agitation for 1 hour, and when cold pour off the clear. *Dose.* ¾ oz. to 1 oz., alone or combined with ½ oz. of tincture of rhubarb; laxative.

INFUSION OF ALOES, (COMPOUND.) *Syn.* Inf. Aloes compositum. *Prep.* (Dr. Fothergill.) Aloes ʒj; rhubarb and calumba, of each ʒiv; lime water f℥viij; spirit of horseradish fʒiv; infuse for 12 hours. An excellent stomachic purgative.

INFUSION OF ANGELICA. *Syn.* Inf Angelicæ. Angelica root ʒvj; boiling water 1 pint; macerate 2 hours and strain. Aromatic and stomachic.

INFUSION OF ARNICA. *Syn.* Inf. Arnicæ. *Prep.* I. (Dr. Joy.) Flowers of leopard's bane (arnica montana) ʒj; boiling water 1 pint; macerate half an hour.

II. (A. T. Thomson.) Leaves or flowers ʒiss or root ℈ij; boiling water f℥xij.

III. (Pereira.) Arnica (flowers or leaves?) ℥ss; boiling water 1 pint. Stimulant, diaphoretic, and diuretic. *Dose.* f℥ss to f℥j. The operation of arnica appears to resemble that of senega. (Sundelin.)

INFUSION OF BARBERRY. *Syn.* Inf. Berberis. *Prep.* (Dr. Copland.) Bark of the barberry shrub ℥ss; boiling water ½ pint; macerate two hours, and strain. *Dose.* 1 to 2 oz. either alone or combined with a little carbonate of soda or potassa and tincture of calumba; in jaundice, biliary fluxes, and other cases where heat and acrimony prevail.

INFUSION OF BARK. *Syn.* Inf. Cinchonæ, (P. L. E. and D.) Inf. Corticis Cinchonæ. Infusion de Quinquina, (*Fr.*) Infuso di China, (*Ital.*) Chinainfusum, (*Ger.*) *Prep.* I. (P. L.) Lanceleaved (pale) cinchona, bruised, ℥j; boiling water 1 pint; macerate for 6 hours in a lightly covered vessel, and strain.

II. (*Inf. cinchonæ sine calore.*) *Prep.* (P. D.) Triturate the bark with a little of the water, and add the remainder (cold) during the trituration; macerate for 24 hours, and decant the clear liquor

III. (P. E.) From any species of cinchona, in a similar way to the infusion of cinchona, P. L.

Remarks. The addition of fʒj of diluted sulphuric acid to the water before pouring on the bark increases its solvent power, and, consequently, the strength of the infusion. *Dose.* f℥j to f℥ij three or four times daily, as a tonic in dyspepsia and convalescences. (See Decoction of Bark.)

INFUSION OF BARK AND MAGNESIA

Syn. INF. CINCHONÆ CUM MAGNESIA. *Prep.* (P. U. S.) Bruised bark ℥j; calcined magnesia ʒj; boiling water f℥xij; boil, digest 1 hour, and strain.

INFUSION OF BARK WITH LIME WATER. *Syn.* INF. CINCHONÆ CUM AQUA CALCIS. *Prep.* (P. U. S.) Bruised cinchona bark ℥j; lime water (cold) 1 pint; macerate 12 hours in a covered vessel.

INFUSION OF BARK, COMPOUND. *Syn.* INF. CINCHONÆ COMPOSITUM. *Prep.* (St. B. H.) Cinchona bark ℥j; red rose leaves ʒiij; orange peel (dried) ʒij; boiling water 1 pint; macerate 2 hours in a covered vessel, strain, and add diluted sulphuric acid ʒiss.

INFUSION OF BARK, CONCENTRATED. *Prep.* I. Coarsely-powdered bark 4 lbs.; boiling water 8 lbs.; macerate for 10 or 12 hours, express the liquor, add rectified spirit of wine 2 lbs.; mix well, let it repose for 24 hours, and filter the clear portion.

II. To the water employed in the last portion, add *diluted* sulphuric acid 2 or 3 fluid ounces, and proceed as before.

III. Coarsely-powdered bark 4 lbs.; cold water 8 lbs.; rectified spirit 2 lbs.; diluted sulphuric acid 3 or 4 oz.; mix the fluids, and either macerate the bark in them for a week in a *closed* vessel, or proceed by the method of displacement. *Product* very superior.

Remarks. One fluid drachm of either of the above, added to 7 fluid drachms of water, produces an extemporaneous infusion of cinchona resembling that of the pharmacopœia.

INFUSION OF BLUE FLAG. *Prep.* Blue flag flowers 1 to 2 oz.; boiling water 1 pint; macerate. *Used* for the color.

INFUSION OF BRAZIL WOOD. *Prep.* From ground Brazil wood as the last. When wanted to keep, 3 oz. of rectified spirit are added to every pint. *Used* as coloring.

INFUSION OF BROOM. *Syn.* INF. SCOPARII. *Prep.* (P. L.) Fresh broom tops ℥j; boiling distilled water 1 pint; macerate for 4 hours in a lightly-covered vessel, and strain. Diuretic *or* purgative. *Dose.* 1 to 4 oz.

INFUSION OF BUCHU. *Syn.* INF. BUCHU, (P. D.) INF. BUCKU, (P. E.) INF. DIOSMÆ, (P. L.) *Prep.* (P. L.) Buchu leaves ℥j; boiling water 1 pint; macerate 2 hours. Tonic, stimulant, and diuretic. *Dose.* 1½ oz. to 2 oz.

INFUSION OF CALUMBA. *Syn.* INF. RADICIS CALUMBÆ. INF. CALUMBÆ, (P. L. & E.) INF. COLOMBÆ, (P. D.) *Prep.* I. (P. L.) Calumba root, sliced, ʒv; boiling distilled water 1 pint; macerate for 2 hours in a lightly-covered vessel, and strain. The Dublin form is similar, but orders only ʒij of calumba root.

II. (*Infusum calumbæ cum aqua frigida.*) *Prep.* (P. E.) Calumba, in coarse powder, ℥ss; cold water 1 pint; triturate with a little of the water so as to moisten it thoroughly, then put it into a percolator, and pass cold water through it until f℥xvj of infusion have been obtained.

Remarks. The infusion prepared by the first of the above formulæ soon spoils, but that prepared by the second will keep for some days. Infusion of calumba is a good tonic and stomachic bitter. *Dose.* 1 to 3 ounces in dyspepsia, &c., and for restraining vomiting and diarrhœa during pregnancy or dentition. It is preferably joined with small doses of carbonate of soda or potassa.

INFUSION OF CALUMBA, (CONCENTRATED.) *Prep.* I. Calumba, in coarse powder, ℥v; boiling water ℥xvj; macerate 2 hours; strain, add rectified spirit ℥iv; and the next day filter.

II. Coarsely-powdered calumba root 5 lbs.; rectified spirit of wine 5½ pints; cold water 11 pints; macerate in a closed vessel with frequent agitation for 5 days; express the liquor, add the whites of 4 or 5 eggs, previously mixed with ¼ pint of cold water, agitate well for 10 minutes, allow it to repose for 1 week, and decant the clear. Should it not be perfectly transparent, it may be filtered through blotting paper. *Product.* 20 lbs.

III. From the same ingredients as the last, but by the method of displacement.

Remarks. The concentrated infusion produced by the last two formulæ is of *very superior quality*, and has acquired a great sale in the wholesale trade. fʒj added to fʒvij of water makes a perfectly transparent liquid, possessing exactly similar virtues to the infusion of calumba, P. L.

INFUSION OF CAPSICUM. *Syn.* INF. CAPSICI. *Prep.* (Pereira.) Powdered capsicum ʒiv; boiling water 1 pint; macerate in a covered vessel for 2 hours. *Dose.* ½ oz. and upwards in malignant sore throat and scarlatina.

INFUSION OF CASCARILLA. *Syn.* INF. CORTICIS CASCARILLÆ. INF. CASCARILLÆ, (P. L. E. & D.) *Prep.* (P. L.) Cascarilla bark, bruised, ℥iss; boiling water 1 pint; macerate 2 hours, and strain. A light and aromatic bitter tonic. *Dose.* 1 to 3 oz., usually combined with carbonate of soda and tincture of cascarilla. It is an excellent medicine in various stomach complaints, debility, diarrhœa, &c.

INFUSION OF CASCARILLA, (CONCENTRATED.) *Prep.* Cascarilla, (good and fragrant,) bruised, 6 lbs.; rectified spirit of wine 3 pints; cold water 6 pints; macerate in a close vessel for 14 days, express the liquor, and filter.

Remarks. The product, if the preceding process be well managed, resembles brandy in color and transparency, and is delightfully fragrant. Should it, however, prove slightly opaque, it may be rendered *brilliant* by shaking it up, first with about a drachm of dilute sulphuric acid, and afterwards with the whites of 3 or 4 eggs, previously mixed with a few ounces of water; it will then either become fine by repose or by filtration. Concentrated infusion of cascarilla may also be advantageously made from the same ingredients by the method of displacement. (See INFUSION OF CALUMBA, CONCENTRATED.) fʒj of this infusion, mixed with fʒvij of water, makes a preparation exactly resembling the infusion of calumba, P. L.

INFUSION OF CATECHU. *Syn.* COMPOUND INFUSION OF CATECHU. INF. CATECHU, (P. E.) INF. CATECHU COMPOSITUM, (P. L. & D.) INFUSION DE CACHOU, (*Fr.*) KATECHU-INFUSUM, (*Ger.*) *Prep.* (P. L.) Catechu ʒvj; bruised cinnamon ʒj; boiling water 1 pint; macerate 1 hour.

Remarks. The Edinburgh college orders f℥xvij of water, and the addition of f℥iij of sirup to the strained liquid. Astringent. *Dose.* 1 to 3 oz. in diarrhœa, 3 or 4 times a day, or after every liquid dejection.

INFUSION OF CENTAURY. *Syn.* INF. CENTAURII. *Prep.* I. (A. T. Thomson.) Summits of (common or lesser) centaury ʒvj; boiling water ½ pint.

II. (P. Cod.) Leaves ʒj; water f℥xvj. Bitter, stomachic; has been proposed as a substitute for infusion of gentian.

INFUSION OF CHAMOMILES. *Syn.* CHAMOMILE TEA. INF. ANTHEMIDIS, (P. L. & E.) INF. CHAMÆMELI, (P. D.) INFUSION DE CAMOMILLE ROMAINE, (*Fr.*) *Prep.* (P. L.) Chamomile flowers ʒv; boiling water 1 pint; macerate 10 minutes, (20 minutes, P. E.,) and strain. Tonic, bitter, and stomachic. *Dose.* 1 to 2 oz. two or three times a day. It should be drunk cold, as it is emetic when warm.

INFUSION OF CHAMOMILES, (CONCENTRATED.) *Prep.* Chamomiles 5 oz.; water 1 pint; boil till the mixture weighs exactly 21 oz.; express the liquor by means of a tincture-press, cool, and add essential oil of chamomile 15 drops, dissolved in rectified spirit of wine 5 oz.; agitate well, let it repose until the next day, then decant the clear, and filter. *Product.* Strongly bitter and odorous, and beautifully transparent. 8 times as strong as the infusion, P. L.

INFUSION OF CHERRY-LAUREL. *Syn.* INF. LAURO-CERASI. *Prep.* (Dr. Cheston.) Fresh cherry-laurel leaves ℥iv; boiling water f℥xxxij; infuse an hour, strain, and add clarified honey ℥iv. This infusion is employed externally; in large doses it is poisonous.

INFUSION OF CHIRETTA. *Syn.* INF. CHIRAYTÆ. INF. CHIRETTÆ. *Prep.* (P. E.) Chiretta ℥iv; boiling water 1 pint; macerate 2 hours. A tonic bitter. *Dose.* 1 to 2 oz. combined with carbonate of soda or tincture of sesquichloride of iron in dyspepsia and debility.

INFUSION OF CLOVES. *Syn.* INF. CARYOPHILLORUM. INF. CARYOPHILLI, (P. L. E. & D.) *Prep.* (P. L.) Bruised cloves ʒiij, (ʒi, P. D.;) boiling water 1 pint; macerate for 2 hours, and strain. A grateful stomachic. *Dose.* 1 to 2 oz. three or four times a day.

INFUSION OF CLOVES, (CONCENTRATED.) *Prep.* I. Bruised cloves ℥iij; boiling water f℥xv; infuse as above and strain; when cold add rectified spirit ¼ pint, and filter.

II. Bruised cloves 1½ lbs.; rectified spirit 1 quart; cold water 3 quarts; macerate for 7 days, express the liquid, and filter. *Product.* Very fine.

Remarks. The above is 8 times the strength of the infusion of cloves, P. L.

INFUSION OF CUSPARIA. *Syn.* INFUSION OF ANGOSTURA. INF. CUSPARIÆ, (P. L. & E.) INF. ANGUSTURÆ, (P. D.) *Prep.* (P. L.) Angustura bark ʒv; boiling water 1 pint; macerate 2 hours. Stimulant and tonic. *Dose.* 1 to 3 oz. three or four times a day, in typhus fever, bilious diarrhœa, dysentery, &c.

INFUSION OF DAHLIA PETALS. From the violet blue variety, 1 oz. to a pint of boiling water.

INFUSION OF DEADLY NIGHTSHADE. *Syn.* INF. BELLADONNÆ. *Prep.* I. (Dr. Paris.) Dried belladonna leaves 4 grs.; boiling water f℥ij; for a dose.

II. (Dr. Saunders.) Leaves ʒss; boiling water f℥xij; infuse, strain, and to every f℥vij of the infusion add compound tincture of cardamoms ℥j.

INFUSION OF DIGITALIS. *Syn.* INF OF FOXGLOVE. INF. DIGITALIS. (P. L. E. & D.) INFUSION DE DIGITALE PURPURINE, (*Fr.*) FINGERHUT AUFGUSS, (*Ger.*) *Prep.* (P. L.) Dried foxglove leaves ʒj; spirit of cinnamon f℥j; boiling distilled water 1 pint; macerate the leaves in the water for 4 hours; strain, and add the spirit.

Remarks. The Dublin form is similar, but the Edinburgh college orders ʒij of the dried leaves. Diuretic and narcotic. *Dose.* ½ oz. to 1 oz. every 8 or 10 hours, till it exerts a sensible effect upon the body.

INFUSION OF ERGOT. *Syn.* INF. ERGOTÆ. INF. SECALIS CORNUTI. *Prep.* (Pereira.) Ergot ʒj; boiling water f℥iv; infuse till cold. *Dose.* One third every half hour until the whole is taken; in labor.

INFUSION OF EUPATORIUM. *Syn.* INF. EUPATORII. *Prep.* (P. U. S.) Eupatorium (perfoliata) ℥j; boiling water 1 pint; macerate 2 hours.

INFUSION OF FUMATORY. *Syn.* INF. OF FUMARIA. INF. FUMARIÆ. *Prep.* Fumaria (officinalis) 1 handful; boiling water 1 quart; infuse one hour. For skin diseases.

INFUSION OF GALLS. *Syn.* INF. GALLÆ. *Prep.* (Pereira.) Bruised galls ʒiv; boiling water f℥vj; infuse. *Dose.* ½ oz. to 2 oz. in intermittents, or 3 to 4 oz. in cases of poisoning by the alkaloids. It is also used in gargles, injections, and embrocations.

INFUSION OF GENTIAN, COMPOUND. *Syn.* INF. GENTIANÆ, (P. E.) INF. GENTIANÆ COMPOSITUM, (P. L. & D.) *Prep.* I. (P. L.) Gentian root, sliced, and *dried* orange-peel, of each, ʒij; *fresh* lemon-peel ʒiv; boiling distilled water 1 pint; infuse for one hour, and strain.

II. (P. E.) Sliced gentian root ℥ss; bitter orange-peel, dried and bruised, and coriander seeds, of each ʒj; proof spirit f℥iv; digest 3 hours, then add of cold water f℥xvj, and in 12 hours more, strain.

III. (P. D.) Gentian ʒij; fresh lemon-peel ℥ss; dried orange-peel ʒiss; proof spirit f℥iv; macerate 3 hours, then add of boiling water f℥xvj, and digest for 2 days in a closed vessel.

Remarks. The above are elegant tonics and stomachics. The dose of the infusion (P. L. and D.) is 1 to 2 oz., that of the infusion (P. E.) ½ oz. to 1 oz. The first speedily spoils, but the infusions of the Edinburgh and Dublin colleges will keep for some time in close vessels.

INFUSION OF GENTIAN, COMPOUND, (CONCENTRATED.) *Prep.* I. Bruised gentian root 4 lbs.; boiling water sufficient to cover it; infuse with occasional agitation for 2 hours, express the liquor, wash the root with a little boiling water, and evaporate to 13 quarts; when *cold*, strain through flannel, add rectified spirit of wine 1 gallon, and pour the mixed fluids on *dried* orange-peel 4 lbs., and *fresh* lemon-peel 8 lbs.; macerate for 1 week, then express the liquor, and filter through paper.

II. Bruised gentian and dried orange-peel, of each 4 lbs.; fresh lemon-peel 8 lbs.; cold distilled water 13 quarts; rectified spirit of wine 1 gallon; pour the mixed fluids on the other ingredients

placed in a stoneware jar, bung close, tie over the vessel with bladder and canvass, and macerate for 14 or 15 days, observing to let the vessel remain *upright* during the night, but *inverted* during the day. At the end of the time express the liquid, add 1 drachm each of the essences of lemon and orange, agitate well, and filter; it runs rapidly through paper. *Product of very superior quality.*

III. Bruised gentian 4½ lbs.; essence of lemon ½ oz.; essence of orange ¼ oz.; essence of cedrat 1 dr.; rectified spirit of wine 1 gallon; cold water 3 gallons; infuse with agitation for a fortnight, press, and filter. *Product.* Very fine and odorous.

Remarks. The above formulæ are actually employed at the present time by houses who do largely in concentrated infusion of gentian, and with proper management the products, especially of the last two, possess all the brilliancy of brandy, and are powerfully bitter, odorous, and aromatic; they also keep well: f℥j added to f℥vij of water, produce a liquid resembling the infusion of the Pharmacopœia in every particular.

INFUSION OF GINGER. *Syn.* Inf. Zingiberis. *Prep.* (Pereira.) Ginger, bruised, ʒij to ʒiij; boiling water f℥vj; macerate for 2 hours. *Dose.* 1 or 2 tablespoonfuls in flatulence and indigestion.

INFUSION OF GRATIOLA. *Syn.* Inf. Gratiolæ. *Prep.* (A. T. Thomson.) Gratiola, dried, ʒij; boiling water f℥viij.

INFUSION of GUAIACUM, COMPOUND. *Syn.* Compound Lime-water. Aqua Calcis composita, (P. D.) Inf. Guaiaci comp. *Prep.* (P. D.) Guaiacum shavings lb. ss; bruised liquorice root ℥j; sassafras ℥ss; coriander seeds ʒiij; lime-water 3 quarts; infuse for 2 days, and strain. *Dose.* 3 to 4 oz. twice or thrice a day, in scrofula, rheumatism, eruptions, &c.

INFUSION OF GUM. *Syn.* Inf. Acaciæ. *Prep.* Gum acacia and lump sugar, of each 2 oz.; boiling water 1 pint; macerate until dissolved, then cool, and add orange-flower water ½ oz. A pleasant demulcent in coughs, hoarseness, &c.

INFUSION OF (STINKING) HELLEBORE. *Syn.* Inf. of Bearsfoot. Inf. Hellebori fœtidi. *Prep.* (Woodville.) Fresh leaves of stinking hellebore ʒij, or dried leaves ʒss; boiling water f℥viij; infuse 1 hour. Cathartic, emetic.

INFUSION OF HEMEDESMUS. *Syn.* Inf. Hemedesmi. *Prep.* (Ashburner.) Root of hemedesmus indicus ℥ij; lime-water 1 pint; infuse 12 hours.

INFUSION OF HEMLOCK. *Syn.* Inf. Conii. Inf. Conii maculati. *Prep.* (Guy's H.) Dried leaves of hemlock and coriander seeds, of each ʒij; boiling water ℥viij; infuse for 2 hours. Combined with acetate of ammonia, tincture of henbane, and sirup of poppies, in pulmonary complaints.

INFUSION OF HOLY THISTLE. *Syn.* Inf. Cardui Benedicti. *Prep.* (P. Cod.) Holy thistle ʒj; boiling water f℥viij; macerate 2 hours. Bitter, tonic, and astringent; in stomach diseases.

INFUSION OF HOP. *Syn.* Inf. Lupuli, (P. L.) Inf. Humuli. *Prep.* (P. L.) Hops ʒvj; boiling water 1 pint; infuse for 4 hours. Tonic and anodyne. *Dose.* f℥j to f℥ij. Well-hopped mild ale is a good substitute.

INFUSION OF HOREHOUND. *Syn.* Inf. Marubii. *Prep.* (Pereira.) Horehound leaves ℥j; boiling water 1 pint; infuse for an hour. *Dose.* ½ to a whole teacupful in coughs, colds, &c.

INFUSION OF HORSERADISH. *Syn.* Inf. Armoraciæ. *Prep.* Horseradish, sliced, ℥iss; boiling water 1 pint; infuse one hour. Diuretic and stomachic. *Dose.* 3 or 4 tablespoonfuls every 3 or 4 hours.

INFUSION OF HORSERADISH, COMPOUND. *Syn.* Inf. Armoraciæ compositum. *Prep.* (P. L.) Sliced horseradish and bruised mustard seed, of each ℥j; compound spirit of horseradish f℥j; boiling water 1 pint; infuse the root and seeds in the water for 2 hours, strain, cool, and add the spirit. Stimulant and diuretic. *Dose.* 1 to 3 oz. every second or third hour, in paralysis, dropsies, &c.

INFUSION OF JUNIPER BERRIES. *Syn.* Inf. Juniperi. Inf. Baccæ Juniperi. *Prep.* (Pereira.) Juniper berries ℥j; boiling water 1 pint; infuse 1 hour. Diuretic. *Dose.* ½ to a whole teacupful, ad libitum.

INFUSION OF LINSEED, (CATHARTIC.) *Syn.* Inf. Lini cathartici. *Prep.* (A. T. Thomson.) Cathartic linseed (purging flax) ʒij; boiling water f℥xvj; infuse 1 hour, and strain.

INFUSION OF LINSEED, COMPOUND. *Syn.* Linseed Tea. Inf. Lini, (P. E.) Inf. Lini compositum, (P. L. and D.) Infusion de Semence de Lin, (*Fr.*) Leinsamen Aufguss, (*Ger.*) Infuso di Semi di Lino, (*Ital.*) *Prep.* (P. L.) Linseed ʒvj; bruised liquorice root ʒij; boiling water 1 pint; macerate for 4 hours near the fire, and strain. A cheap and useful demulcent. *Dose.* f℥ij ad libitum. In pulmonary and urinary irritation.

INFUSION OF LIQUORICE. *Syn.* Inf. Glycyrrhizæ. *Prep.* (St. B. H.) Fresh liquorice root ℥j; boiling water 1 pint; macerate 2 hours. Demulcent; taken ad libitum.

INFUSION OF LITMUS. See Infusion of Archil, page 72.

INFUSION OF LOBELIA. *Syn.* Inf. Lobeliæ. Inf. Lobeliæ inflatæ. *Prep.* (Collier.) Lobelia (Indian tobacco) ℥j; boiling water ½ a pint; infuse half an hour, and strain. *Dose.* f℥ss every half hour until it nauseates. In asthma.

INFUSION OF LOGWOOD. *Syn.* Inf. Hæmatoxyli. *Prep.* Logwood 1 oz.; boiling water 1 pint; infuse 1 hour. *Used* as a color and test.

INFUSION OF MALLOW FLOWERS. As the last.

INFUSION OF NARCISSUS. *Syn.* Inf. Narcissi. *Prep.* (Dufresnoy.) Flowers 3 to 16 in number; boiling water 1 pint; infuse.

INFUSION OF ORANGE-PEEL, COMPOUND. *Syn.* Inf. Aurantii. Inf. Aurantii compositum, (P. L.) *Prep.* (P. L.) Dried orange-peel ℥ss; fresh lemon-peel ʒij; bruised cloves ʒj, boiling water 1 pint; infuse for 15 minutes, and strain. A pleasant stomachic. *Dose.* 1 or 2 oz. twice or thrice a day.

INFUSION OF ORANGE-PEEL, COMPOUND, (CONCENTRATED.) *Prep.* I. Dried orange-peel 3 lbs.; fresh lemon-peel 1½ lbs.;

bruised cloves ¾ lb.; boiling water 9 pints; infuse for 20 minutes, press out the liquor, and when cold, add rectified spirits 1 quart; filter.

II. Dried orange-peel 3 lbs.; fresh lemon-peel 1½ lb.; bruised cloves ¾ lb.; rectified spirit 3 pints; cold water 9 pints; macerate for 1 week, press, and filter. *Product very superior.*

Remarks. f℥j of either of the above, added to f℥vij of water, makes a similar (preferable) preparation to the compound infusion of orange-peel, P. L.

INFUSION OF PEACH LEAVES. *Syn.* INF. PERSICÆ. *Prep.* (Pereira.) Dried peach leaves ℥ss; boiling water 1 pint. *Dose.* ½ oz. 2 or 3 times a day. As a vermifuge, and to allay irritation of the bladder and urethra.

INFUSION OF PEPPERMINT. *Syn.* INF. MENTHÆ PIPERITÆ. *Prep.* 1 oz. of the herb to 1 pint of boiling water. *Dose.* A teacupful ad libitum, as a stomachic.

INFUSION OF PAREIRA. *Syn.* INF. PAREIRÆ. *Prep.* (P. L.) Pareira brava ʒvj; boiling water 1 pint; macerate 2 hours. *Dose.* 1 to 2 oz., in irritation of the urinary organs.

INFUSION OF PERIWINKLE. *Prep.* Petals 1 oz. to boiling water 1 pint.

INFUSION OF PYROLA. *Syn.* INF. OF WINTER GREEN. INF. CHIMAPHILÆ. INF. PYROLÆ. *Prep.* (Collier.) Pyrola leaves ℥j; boiling water 1 pint; infuse. Astringent, diuretic. *Dose.* 1 to 2 oz. It blackens the urine, like uva ursi.

INFUSION OF QUASSIA. *Syn.* INF. QUASSIÆ. *Prep.* (P. L.) Quassia wood chips ℈ij; boiling distilled water 1 pint; macerate for 2 hours, and strain. *Dose.* 1 to 3 oz. twice or thrice a day, in dyspepsia, &c. It is not turned black by chalybeates.

INFUSION OF QUASSIA AND ZINC. *Syn.* INF. QUASSIÆ CUM ZINCI SULPHATE. *Prep.* (P. U. S.) Quassia ʒj; sulphate of zinc 8 grs.; boiling water ½ pint.

INFUSION OF RED CABBAGE. 1 oz. of the dried leaves to boiling water 1 pint. *Use.* As a color and test. It will not keep without the addition of 1½ to 2 oz. of spirit to the above quantity.

INFUSION OF RHATANY. *Syn.* INF. RHATANIÆ. INF. KRAMERIÆ. *Prep.* (P. L.) Rhatany root ℥j; boiling water 1 pint; infuse 2 hours. Astringent. *Dose.* ½ oz. to 2 oz. in chronic diarrhœa.

INFUSION OF RHUBARB. *Syn.* INF. RHEI. (P. L. E. & D.) *Prep.* (P. L.) Sliced rhubarb ʒiij; distilled water 1 pint; macerate 2 hours, and strain.

II. (P. E.) Rhubarb, in coarse powder, ℥j; boiling water ℥xviij; infuse for 12 hours, add spirit of cinnamon f℥ij, and strain through linen or calico. Stomachic and purgative. *Dose.* Of the infusion P. L. f℥j to f℥iij, and that of the P. E. about half that quantity, along with neutral salts or aromatics.

INFUSION OF RHUBARB, ALKALINE. *Syn.* INF. RHEI ALKALINUM. *Prep.* (Dr. Copland.) Rhubarb ʒij; carbonate of potassa ʒj; boiling water ½ a pint; infuse for 4 hours, strain, and add tincture of cinnamon ℥ss.

INFUSION OF RHUBARB AND BORAX. *Syn.* INF. RHEI BORAXATUM. *Prep.* (P. Pol.) Rhubarb ʒvj; borax ʒj; boiling water ℥vj; infuse, strain, and add of cinnamon water ℥j.

INFUSION OF RHUBARB, CONCENTRATED. *Prep.* Rhubarb reduced to coarse powder 3 lbs.; *cold* distilled water 11 pints; rectified spirit of wine 5½ pints; mix, let it stand for 8 days, employing frequent agitation, then press out the liquor, and filter.

Remarks. The product of the above process is 8 times as strong as the infusion of rhubarb, P. L. This is the only way a fine, rich-colored, and transparent concentrated preparation can be made, that will keep. Should it not prove perfectly limpid it may be clarified with a little white of egg, as directed under INFUSION OF CALUMBA, CONCENTRATED.

INFUSION OF ROSES. *Syn.* INF. ROSÆ 1 oz. of petals to a pint of boiling water.

INFUSION OF ROSES, COMPOUND *Syn.* INF. ROSÆ, (P. E.) INF. ROSÆ COMPOSITUM, (P. L.) INF. ROSÆ ACIDUM, (P. D.) INF. ROSARUM. INF. ROSARUM COMP. TINCTURA ROSARUM, (P. L. 1746.) INFUSION DES ROSES, (*Fr.*) ROSEN AUFGUSS, (*Ger.*) INFUSO DI ROSE, (*It.*) *Prep.* (P. L.) Dried petals of the red rose ʒiij; diluted sulphuric acid fʒiss; (℥ss, P. D.;) boiling distilled water 1 pint, (lb. iij by measure, P. D.;) white sugar ʒvj; (℥iss, P. D.) Pour the water on the petals, placed in a vessel of glass or earthenware, stir in the acid, and infuse for 6 hours, strain, and add the sugar.

Remarks. The Edinburgh College orders the acid not to be added until after the infusion is strained from the leaves, and the period of the maceration to be only 1 hour. Infusion of roses is principally used as a vehicle for sulphate of quinine, saline purgatives, and other medicines. It is astringent and refrigerant, and, when diluted with water, forms a pleasant drink in febrile disorders, phthisical sweats, hemorrhages, diarrhœa, &c. *Dose.* f℥j to f℥iv, either alone or diluted with water. It is incompatible with the alkalis and earths.

INFUSION OF ROSES, CONCENTRATED. *Prep.* I. Rose petals or leaves 3 lbs.; boiling water 2 gallons; infuse 2 hours, with constant agitation, then press out the liquor in a *very clean* tincture press, strain through flannel or a hair sieve, add diluted sulphuric acid 24 oz., (by measure,) agitate well, and filter through paper supported on coarse calico; lastly, add 6 lbs. of the finest white sugar broken up into small lumps, but perfectly free from dust and dirt. When dissolved, put the infusion into clean, stoppered green glass bottles, and keep it from the light in a cool place. *Product* very superior.

II. Take rose leaves, acid, and *cold* water, as last, mix, and infuse for 48 hours in a clean, covered, earthenware vessel, then press out the liquid with the hands, filter, and add the sugar, as before. *Product* very fine, and keeps well.

Remarks. The above infusion is 8 times as strong as that of the London Pharmacopœia. In employing the first formula, care should be taken that the utensils be *perfectly clean*, especially the press, and earthenware glazed with lead should be avoided. The "*pressing*" should also be conducted as rapidly as possible, to avoid the color being injured by the iron, though I find that clean iron does not readily injure infusion of roses *before* the addition of the acid. Should not the infusion filter

quite clear through paper, the addition of the whites of 2 or 3 eggs, diluted with 2 or 3 ounces of water, followed by violent agitation of the liquid for a few minutes, and repose for an hour or two, will usually render it fine, when it may either be decanted or filtered should it require it. It will now pass rapidly through ordinary filtering paper, and at once run clear.

INFUSION OF SAGE. *Syn.* Inf. Salviæ. *Prep.* (A. T. Thomson.) Sage leaves, dried, ℥j; boiling water 1 pint; infuse ½ an hour. Aromatic.

INFUSION OF SARSAPARILLA. *Syn.* Inf. Sarzæ. Inf. Sarsaparillæ. *Prep.* Sarsaparilla, sliced, ℥j; boiling water 1 pint; macerate 2 hours, and strain.

INFUSION OF SARSAPARILLA, COMPOUND. *Syn.* Inf. Sarzæ comp. Inf. Sarsaparillæ compositum, (P. D.) *Prep.* Sarsaparilla washed in cold water, and sliced, ℥j; lime water 1 pint; macerate in a close vessel for 12 hours, with frequent agitation. Alterative, in skin diseases, or with or after a course of mercurials. Lime water extracts less from sarsaparilla than cold distilled water. (Battley.)

INFUSION OF SENNA. *Syn.* Inf. Sennæ. *Prep.* Senna leaves ℥iss; boiling water 1 pint; macerate 2 hours. Purgative. *Dose.* 1 oz. combined with 3 to 6 drs. of Epsom salts, or other saline purgative.

INFUSION OF SENNA, COMPOUND. *Syn.* Senna Tea. Inf. Sennæ compositum, (P. L. & D.) Inf. Sennæ, (P. E.) Infusion de Sene, (*Fr.*) Senna Aufguss, (*Ger.*) Infuso di Senna, (*It.*) *Prep.* (P. L.) Senna leaves ʒxv; bruised ginger ℈iv; boiling water 1 pint; macerate 1 hour, and strain. Purgative. *Dose.* 2 to 4 oz., usually combined with some aperient salt.

INFUSION OF SENNA, COMPOUND. (CONCENTRATED.) *Prep.* I. Alexandria senna (Opt.) 6 lbs.; bruised unbleached Jamaica ginger 2¼ lbs.; rectified spirit, and water, of each 1 gallon; macerate for 14 days, press out the fluid, filter, and set it aside in a well-corked bottle; then take 24 lbs. of good East India senna, and the pressings from the tincture, (above,) and macerate in the least possible quantity (10 or 12 gallons) of *cold* water, for 12 or 14 hours, employing frequent agitation; press out the liquid, and again macerate the residue in *cold* water (5 or 6 gallons) for 2 hours; press, mix the two liquors, strain, heat gradually to the boiling point, carefully separate the coagulated albumen, and evaporate as quickly as possible to exactly 9 quarts; put the liquid into a vessel capable of holding 5 gallons, bung close to exclude the air, and when cold add the "*tincture*" obtained from the Alexandria senna and ginger; mix well, allow it to stand for a week, and decant the clear portion. This process, if skilfully managed, yields a beautiful article.

II. The same as the last, but employ *hot* water, and limit the period of the infusions to 2 hours and 1 hour. *Prod.* Good, but there is a large deposite, from which the last portion of the infusion cannot be readily procured.

III. Take 8 times the pharmacopœia quantity of senna and ginger, put them into a percolator, either alone, or mixed with clean washed sand, and pass water, mixed with ¼th rectified spirit, through the mass, until the proper quantity of infusion is obtained. *Product* very superior, but the process requires considerable address to manage it satisfactorily.

Remarks. All the preceding forms are at present actually employed in the wholesale trade, and with proper management cannot possibly fail of producing superior products. They each give an infusion possessing 8 times the strength of that of the pharmacopœia.

From the extreme bulkiness of senna, it has become a practice with some unprincipled persons to employ only ⅓ or ¼ of the proper quantity of that drug, and to add burnt sugar or treacle to bring up the consistence and color, and an alkaline solution of gamboge to impart the necessary purgative quality; but this fraudulent practice may be detected in the way described at p. 292, (Art. Extract of Colocynth, comp.) Pure infusion of senna reddens litmus paper. Concentrated infusion of senna, as generally met with, is next to worthless. This arises either from the employment of inferior senna, or the destruction of its active principle, by lengthened exposure to heat and atmospheric oxygen, during its manufacture.

INFUSION OF SENNA AND TAMARINDS. *Syn.* Inf. Sennæ compositum, (P. E.) Inf. Sennæ cum Tamarindis, (P. D.) *Prep.* (P. E.) Senna ʒiij; tamarinds ℥j; coriander seeds ʒj; sugar ℥ss, (if brown ℥j;) boiling water f℥viij; infuse for 4 hours, with agitation, then strain through calico. Pleasanter than the ordinary infusions of senna.

INFUSION OF SENNA AND CREAM OF TARTAR. *Syn.* Inf. Sennæ Tartarizatum. *Prep.* (P. L. 1788.) Senna ℥iss; coriander seeds ℥ss; cream of tartar ʒij; boiling water lb.j; infuse 1 hour. Purgative.

INFUSION OF SENNA, LEMONATED. *Syn.* Inf. Sennæ Limoniatum. *Prep.* (P. L. 1746.) Senna ℥iss; fresh lemon peel ℥j; lemon juice f℥j; boiling water f℥xvj; as last.

INFUSION OF SENEGA. *Syn.* Inf. Senegæ. *Prep.* (P. E.) Senega (rattlesnake) root ʒij; boiling water 1 pint; infuse for 4 hours.

INFUSION OF SERPENTARY. *Syn.* Inf. Serpentariæ. *Prep.* (P. L. & E.) Serpentary (Virginian snake) root ʒiv; boiling water 1 pint; macerate for 4 hours. Tonic, stimulant, and diaphoretic. *Dose.* ½ oz. to 2 oz., in low fevers.

INFUSION OF SIMAROUBA. *Syn.* Inf. Simaroubæ, (P. L. E. & D.) *Prep.* (P. L.) Simarouba bark ʒiij; boiling water 1 pint; macerate 2 hours. *Dose.* 1 to 2 oz., as a tonic; emetic in larger doses.

INFUSION OF SPIGELIA. *Syn.* Worm Tea. Inf. of Pink Root. Inf. Spigeliæ. *Prep* (P. U. S.) Pink root ℥ss; boiling water f℥xv; infuse for 2 hours. Vermifuge. *Dose.* ½ oz. to 1 oz., for a child 3 years of age; for an adult 4 to 8 oz., morning and evening. It is usually combined with an equal quantity of infusion of senna, and, in America, with manna and savine as well.

INFUSION OF SPIGELIA AND SENNA. *Syn.* Inf. Spigeliæ cum Senna. *Prep.* Pink root and senna, of each, ʒiv; boiling water 1 pint: as last.

INFUSION OF SPIGELIA, COMPOUND *Syn.* Inf. Spigeliæ compositum. *Prep.* (Sprague.) Pink root ℥ss; senna ʒij; orange peel, worm seed,

and sweet fennel seed, of each, ℨj; boiling water, f℥xij; infuse 2 hours. Vermifuge. *Dose.* A wine-glassful or more every morning, fasting.

INFUSION OF SPEARMINT. *Syn.* Inf. Menthæ simplex. *Prep.* (P. D.) Dried leaves ℨij; boiling water f℥viij; infuse half an hour. Stomachic. *Dose.* A wine-glassful ad libitum.

INFUSION OF SPEARMINT, COMPOUND. *Syn.* Inf. Menthæ comp. *Prep.* (P. D.) To the last, as soon as cold, add oil of mint 3 drops, and lump sugar ℨij, previously rubbed together, and dissolved in compound tincture of cardamoms f℥ss. *Dose.* As last. A grateful stomachic, in flatulency, &c.

INFUSION OF SWEETFLAG.* *Syn.* Inf. Acori Calami. *Prep.* I. (Brande.) Calamus aromaticus ℥j; boiling water 1 pint; macerate 4 hours.

II. (Paris.) Dried root ℨvj, to water f℥xij.

III. (Pereira.) ℥j to f℥xij of water. Stomachic, tonic, febrifuge.

INFUSION OF TANSY. *Syn.* Tansy Tea. Inf. Tanaceti. *Prep.* I. (Pereira.) Green herb ℥j; boiling water 1 pint; infuse.

II. (Nieman.) Tansy ℥j; boiling water 1 pint. Aromatic, bitter, tonic, and vermifuge. *Dose.* 2 to 4 oz.

INFUSION OF TOBACCO. *Syn.* Inf. Tabaci. *Prep.* (P. D.) Tobacco leaves ℨj; water 1 pint; infuse for half an hour. (See Enema of Tobacco.)

INFUSION OF TREFOIL. *Syn.* Inf. Menyanthis. *Prep.* (Pereira.) Marsh trefoil leaves ℥ss; boiling water f℥xvj; infuse 1 hour.

INFUSION OF TURMERIC. *Syn.* Inf. Curcumæ. *Prep.* Turmeric ℥iss; boiling water 1 pint; infuse 1 hour. Used as a test, and to prepare a test-paper. Alkalis turn it brown. If wanted to keep, add spirit of wine f℥iij, to the cold infusion.

INFUSION OF VALERIAN. *Syn.* Inf. Valerianæ, (P. L. & D.) *Prep.* (P. L.) Valerian root ℥ss; boiling water 1 pint; macerate half an hour, in a covered vessel. *Dose.* 1½ oz. to 2 oz., two or three times a day, in nervous and hysterical complaints.

INFUSION OF WHORTLEBERRY. *Syn.* Inf. Uvæ Ursi. *Prep.* Leaves ℨiv; boiling water 1 pint; macerate 3 hours. With alkalis, henbane or opium, in diseases of the urinary organs; and with sulphuric acid and foxglove, in affections of the lungs.

INFUSION OF WORMWOOD. *Syn* Inf. Absinthii. *Prep.* (Brande.) Fresh leaves of wormwood ℥ij; boiling water 1 pint; macerat 4 hours. Bitter, stomachic.

INFUSION, PECTORAL. *Syn.* Inf. pectorale. *Prep.* (E. H.) Linseed ℥iss; liquorice ℨiv; coltsfoot leaves ℥j; boiling water 3 pints; digest 4 hours, and strain.

INFUSION, STIMULANT. *Syn.* Inf. stimulans. *Prep.* (Dr. Paris.) Black mustard seed, bruised, and dittander, of each, ℥ss; boiling water ℥xvj; macerate for 1 hour, strain, and when cold add spirits of sal volatile ℨj; spirit of pimento ℥ss. *Dose.* 2 tablespoonfuls 3 times a day in palsy.

INFUSIONS, TONIC. *Syn.* Strengthening Infusions. *Prep.* I. Compound infusion of gentian 1 oz.; bicarbonate of potassa or soda 20 grs.; tincture of cascarilla fℨj; mix for a dose.

II. Infusion of cascarilla 1½ oz.; tinctures of cascarilla and ginger, of each, 1 dr.; mix for a dose.

III. Infusion of calumba 1 oz.; bicarbonate or carbonate of soda 25 grs.; tincture of ginger and compound tincture of cardamoms, of each, ℨj; mix for a dose. The above are all taken in dyspepsia, and in loss of appetite arising from hard drinking.

INFUSIONS, (CONCENTRATED.) These are now very generally met with in trade, and are made of 8 times the pharmacopœial strength. They are mostly prepared by employing 8 times the usual quantity of ingredients, and only ¾ths of the proper quantity of water, and adding to the strained liquor, when cold, sufficient spirit of wine to bring the liquid up to the proper strength, (about ¼ of the weight of the strained infusion.) A still better plan is to treat 8 times the usual quantity of the ingredients with a mixture of rectified spirit 1 part, and cold water 3 parts; in the usual way for making tinctures, either by maceration for 7 to 14 days, or by percolation. Concentrated infusions made in this way keep well, and deposite scarcely any sediment. Many houses that are remarkable for the brilliancy and beauty of these preparations, employ ¼ spirit of wine and ¾ water as the menstruum. It may, however, be taken as a general rule, that for vegetable substances that abound in woody fibre, and contain but little extractive matter soluble in water, (as quassia for instance,) $\frac{1}{6}$ to $\frac{1}{5}$ part of spirit is sufficient for their preservation; while for those abounding in mucilage or fecula, or that readily soften and become pulpy and glutinous in *weak* spirit (as rhubarb) ¼ to ⅓ is required. By macerating in the infusion as much bruised mustard seed as can be added without flavoring the liquor, along with a little bruised cloves, I find that most vegetable infusions may be preserved without either fermenting or becoming mouldy with very little spirit, ($\frac{1}{8}$, or $\frac{1}{10}$;) in fact, I have now by me infusions of quassia and orange-peel, and compound decoction of sarsaparilla, which were prepared without any spirit 18 months ago, and which are now as transparent and full-flavored as when first made. (See Concentrated Decoctions.)

INHALATION. Inhalatio, (*Lat.*, from *inhalo*, to breathe in.) In Medicine, the drawing in of vapors or gases along with the breath, for the purpose of their acting on the mucous membrane of the air-passages. The substances that are to furnish the vapors or fumes are put into a vessel called an '*inhaler*,' which is merely a small covered pot or mug of metal or glass, furnished with a short flexible tube, terminating in a small mouth-piece. The following are the principal substances that are employed for the above purpose at the present day:—1. *The steam of hot water*, in bronchitis, and to allay the cough in phthisis; small quantities of the seeds of henbane, opium, poppy-heads, &c., are frequently added to produce an anodyne effect. 2. *Tar vapor*, obtained by heating tar, mixed with a little carbonate of potash, over a spirit lamp. Occasionally employed in bronchitis, and recommended by Sir A. Crighton in phthisis, but is useless in the latter. 3. *Chlo-*

rine gas, exhibited by adding 5 or 6 drops of aqueous chlorine to the water (tepid) of the inhaler, which should be of glass. Employed in France for phthisis, but seldom used in England. 4. *Vapor of iodine*, administered as the last, and occasionally used in phthisis. 5. *Oxygen and hydrogen gases*, alone or diluted with air, employed in asthma and phthisis, by means of a bladder and mouth-piece. 6. *Carbonic acid gas and nitrous oxide*, occasionally used as the last in phthisis.

INJECTION. *Syn.* INJECTIO, (*Lat.*, from *injicio*, to cast into.) Liquid medicines thrown into the cavities of the body by means of a syringe or elastic bag. Those thrown into the rectum are commonly called *clysters*, or *enemata*. (See ENEMA.) The following are the principal injections employed in medical practice at the present day:—

INJECTION FOR DEAFNESS. *Syn.* INJECTIO ACOUSTICA. *Prep.* I. Ox gall 3 dr.; balsam of Peru 1 dr.; mix.

II. Oil of almonds or olives 2 oz.; oil of amber 20 drops; tincture of castor 1 dr.; spirit of camphor ½ dr.; laudanum 3 drops; mix.

INJECTION, LITHONTRIPTIC. *Syn.* INJ. LITHONTRIPTICA. *Prep.* (Chevallier.) Carbonate of soda ʒj; Castile soap ℥ij; water f℥xij; dissolve. For calculus.

INJECTION OF ACETATE OF AMMONIA. *Syn.* INJ. AMMONIÆ ACETATIS. *Prep.* (P. C.) Liquor of acetate of ammonia ℥j; water ℥iij; mix.

INJECTION OF ALUM. *Syn.* INJ. ALUMINIS. *Prep.* I. (Collier) *a.* Alum 18 grs.; rose-water f℥vj; for the urethra.—*b.* Alum ʒiij; water 1 quart; for the vagina.

II. (Brande.) Compound liquor of alum ʒvj; water f℥viss; mucilage ℥ss.

III. (P. C.) Alum 4 grs.; rose-water ℥iv. All the above are astringent.

INJECTION OF AMMONIA. *Syn.* INJ. AMMONIÆ. *Prep.* (Lavagna.) Liquor of ammonia 8 to 12 drops; milk ℥ij; mix. Stimulant and emollient.

INJECTION OF BICHLORIDE OF MERCURY. *Syn.* INJ. HYDRARGYRI BICHLORIDI. INJ. CORROSIVI SUBLIMATI. *Prep.* I. (P. C.) Corrosive sulimate 8 to 12 grs.; water 1 quart.

II. (P. H.) To the last add wine of opium f℥j.

III. Corrosive sublimate 5 grs.; rose-water 2 oz. Used to promote a healthy action, and to prevent infection.

INJECTION OF CALOMEL. *Syn.* INJ. CALOMELANOS. *Prep.* (P. C.) Calomel ʒss; quince mucilage ℥iv.

INJECTION OF CHLORINE. *Syn.* INJ. CHLORINATA. *Prep.* Liquor of chloride of soda ʒj; water ℥ij. As above.

INJECTION OF COPAIBA. *Syn.* INJ COPAIBÆ. *Prep.* (P. C.) Balsam of copaiba ʒij; mucilage ℥ss; lime water ℥iv; make an emulsion. Used in diseases of the mucous membranes of the urethra and vagina.

INJECTION OF ACETATE OF COPPER. *Syn.* INJ. CUPRI ACETATIS. *Prep.* (P. C.) Verdigris 10 grs.; oil of almonds ℥iv; triturate until dissolved, then strain.

INJECTION OF ACETATE OF LEAD. *Syn.* INJ. PLUMBI ACETATIS. *Prep.* (Collier.) Sugar of lead 40 grs.; rose-water ℥viij.

INJECTION OF AMMONIATED COPPER. *Syn.* INJ. CUPRI AMMONIATI. INJ. CUPRI AMMONIO-SULPHATIS. *Prep.* I. (P. C.) Liquor of ammonio-sulphate of copper 20 drops; rose-water ℥iv.

II. (Swediaur.) Ammonio-sulphate of copper 5 grs.; rose-water ℥viij.

INJECTION OF SULPHATE OF COPPER. *Syn.* INJ. CUPRI SULPHATIS. *Prep.* Sulphate of copper 5 grs.; rose-water ℥iv.

INJECTION OF SULPHATE OF COPPER, (COMPOUND.) *Prep.* To the last add solution of diacetate of lead 20 drops. The above cupreous injections are all mildly detergent and escharotic.

INJECTION OF CUBEBS. *Syn.* INJ. CUBEBÆ. *Prep.* Cubebs, in powder, ℥j; extract of belladonna ʒj; boiling water f℥xvj; infuse in a covered vessel, and strain. In diseases of the mucous membranes. Irritant and narcotic.

INJECTION OF LEAD. *Syn.* INJ. PLUMBI. *Prep.* Liquor of diacetate of lead ʒss; rose-water ℥j.

INJECTION OF LEAD AND OPIUM. *Syn.* INJ. PLUMBI OPIATA. *Prep.* (Wendt.) Aqueous extract of opium 1½ gr.; mucilage ʒij; solution of diacetate of lead 4 drops; water ℥ij. The above are cooling, sedative, and anodyne.

INJECTION OF MERCURY. *Syn.* INJ. HYDRARGYRI. *Prep.* I. (P. C.) Quicksilver ʒj; gum ℥iss; rub till combined, then add water ℥iss.

II. (E. H.) Quicksilver and balsam of copaiba, of each ʒiv; yelk of 1 egg; rose-water ½ a pint. As last.

INJECTION OF MORPHIA. *Syn.* INJ. MORPHIÆ. *Prep.* (Brera.) Morphia 2 grs.; oil of almonds ℥j; dissolve. Anodyne and emollient.

INJECTION OF MURIATIC ACID. *Syn.* INJ. ACIDI MURIATICI. *Prep.* (P. C.) Muriatic acid 8 drops; water ℥iv.

INJECTION OF NITRATE OF SILVER. *Syn.* INJ. ARGENTI NITRATIS. *Prep.* I. (Collier.) Nitrate of silver 2 grs.; rose-water 1 oz.; dissolve.

II. (Jewell.) Nitrate of silver 12 grs.; distilled water f℥vj. For fistulous sores.

INJECTION OF OIL OF ALMONDS. *Syn.* INJ. OLEOSA. *Prep.* (P. C.) Oil of almonds ʒiv; solution of diacetate of lead 8 drops; mix. Emollient and sedative.

INJECTION OF OPIUM. *Syn.* INJ. OPIATA. *Prep.* I. (P. C.) Laudanum 40 drops; water ℥iv.

II. (Fr. H.) Wine of opium ʒj; barley water 1 pint. Anodyne.

INJECTION OF TANNIN. *Syn.* INJ. TANNINI. INJ. ACIDI TANNICI. *Prep.* (Richard.) Tannin ℈j; water ℥viij; dissolve. Astringent.

INJECTION OF TEA. *Syn.* INJ. THEÆ. *Prep* (P. C.) Green tea ʒj; boiling water ℥viij; infuse. Astringent; frequently used in fluor albus.

INJECTION OF TURPENTINE. *Syn.* INJ. TEREBINTHINÆ. *Prep.* (St. B. H.) Olive oil f℥xij; oil of turpentine f℥iss. Vermifuge.

INJECTION OF WINE. *Syn.* INJ. VINI. *Prep.* (Earle.) Red wine ℥xij; water ℥iv; mix. Astringent; in hydrocele.

INJECTION OF WHITELEAD. *Syn.* INJ. CERUSSÆ COMP. *Prep.* (P. C.) Compound

powder of carbonate of lead ℈j; sulphate of zinc 6 grs.; rose-water ℥iv.

INJECTION OF ACETATE OF ZINC. *Syn.* INJ. ZINCI ACETATIS. *Prep.* Sulphate of zinc ʒj; acetate of lead ℈iv; water 1 pint; mix, and filter.

INJECTION OF SULPHATE OF ZINC. *Syn.* INJ. ZINCI SULPHATIS. *Prep.* (P. C.) Sulphate of zinc 4 to 10 grs.; water f℥iv.

INK. *Syn.* WRITING FLUID. ATRAMENTUM, (*Lat.*) ENCRE, (*Fr.*) TINTE, (*Ger.*) Colored liquid employed for writing with a pen. Ink is made of various substances and colors, of which the following are the principal:—

INK, BLACK. *Prep.* I. Bruised Aleppo nutgalls 12 lbs.; water 6 galls.; boil in a copper vessel for 1 hour, adding water to make up for the portion lost by evaporation; strain and again boil the galls with water 4 gallons, for ½ an hour, strain off the liquor and boil a third time with water 2½ gallons, and strain; mix the several liquors, and while still hot add green copperas, coarsely powdered, 4 lbs.; gum arabic bruised small 3½ lbs.; agitate until dissolved, and after defecation, strain through a hair sieve, and keep it in a bunged-up cask for use. *Product.* 12 gallons, very fine and durable.

II. Campeachy logwood chips 3 lbs.; bruised galls 9 lbs.; boil in water as above, and to the mixed liquors add gum arabic and green copperas, of each 4 lbs.; to produce 16½ galls. of ink. *Quality.* Very good.

III. (Lewis.) Bruised galls, 3 lbs.; gum and sulphate of iron, of each 1 lb.; vinegar 1 gall.; water 2 galls.; macerate with frequent agitation for 14 days. To produce 3 galls. Fine quality.

IV. (M. Ribaucourt.) Bruised galls 1 lb.; logwood, in thin chips, and sulphate of iron, of each ½ lb.; gum 6 oz.; sulphate of copper and sugar candy, of each 1 oz. Boil the galls and logwood in 2½ galls. of water for 1 hour, or until reduced to one half, strain, add the other ingredients, and stir until dissolved, then decant and preserve in stone or glass bottles, well corked. Full colored.

V. (M. Desormeaux, jun.) Logwood chips 4 oz.; water 6 quarts; boil 1 hour and strain 5 quarts; add bruised galls 1 lb.; sulphate of iron calcined to whiteness 4 oz.; brown sugar 3 oz.; gum 6 oz.; acetate of copper ¼ oz.; agitate twice a day for a fortnight, then decant the clear, bottle and cork up for use.

VI. Bruised galls 2 lbs.; logwood, green copperas, and gum, of each 1 lb.; water 6 gallons; boil the whole of the ingredients in the water for 1½ hours, and strain 5 galls. Good, but not fine.

VII. Bruised galls 1 lb.; logwood 2 lbs.; common gum ¾ lb.; green copperas ½ lb.; water 5 gallons; boil. Common, but fit for ordinary purposes.

VII. (*Patent.*) Logwood shavings and powdered galls, of each 2 lbs.; green vitriol 1 lb.; gum ½ lb.; pomegranate bark ¼ lb.; water 1 gallon; infuse 14 days, with frequent agitation.

VIII. (*Asiatic.*) The same as the last. Both write pale, but turn very black by keeping, and flow well from the pen.

IX. (*Used in the Prerogative Office.*) Bruised galls 1 lb.; gum arabic 6 oz.; alum 2 oz.; green vitriol 7 oz.; kino 3 oz.; logwood raspings or saw-dust 4 oz.; water 1 gallon; macerate as last. *Said* to write well on parchment.

X. (*Japan.*) This is a black and glossy kind of ink, which may be prepared from either of the above receipts by calcining the copperas until white or yellow, or by sprinkling it (in powder) with a little nitric acid before adding it to the decoction, (preferably the former,) by which the ink is rendered of a full black as soon as made. The glossiness is given by using more gum. Flows less easily from the pen, and is less durable than ink that writes paler and afterwards turns black.

XI. (*Exchequer.*) Bruised galls 40 lbs.; gum 10 lbs.; green sulphate of iron 9 lbs.; soft water 45 gallons; macerate for 3 weeks, employing frequent agitation. "This ink will endure for centuries."

Remarks. The ink prepared by the first formula is the most durable, and will bear dilution with *nearly* its own weight of water, and still be equal to the ordinary ink of the shops. I have writing by me that was executed with this kind of ink upwards of 50 years ago, which still possesses a good color. The respective qualities of the others are noticed at the foot of each.

According to the most accurate experiments on the preparation of black ink, it appears that the quantity of sulphate of iron should not exceed one-third part of that of the galls, by which an excess of coloring matter, which is necessary for the durability of the black, is preserved in the liquid. Gum, by shielding the writing from the action of the air, tends to preserve the color, but if much is employed, the ink flows languidly from *quill* pens, and scarcely at all from *steel* pens. The latter require a very limpid ink. The addition of sugar increases the flowing property of ink, but makes it dry more slowly, and frequently passes into vinegar, when it acts injuriously on the pen. Vinegar, for a like reason, is not calculated for the menstruum.

The addition of a few bruised cloves, or a little oil of cloves; or still better, a few drops of creosote, will effectually prevent any tendency to *mouldiness* in ink. The best *blue* galls should alone be employed in making ink.

Sumach, logwood, and oak bark, are frequently substituted for galls in the preparation of *common* ink. When such is the case, only about one-sixth or one-seventh of their weight of copperas should be employed.

The most permanent (tanno-gallate) inks are those which contain the proper quantity of oxide of iron, at the minimum of oxidizement, in a state of solution or minute suspension, by which means, not only does a larger quantity of the fluid flow from the pen on to a given space, but it also sinks into the substance of the paper, by which the stain is rendered more permanent and less easily removed by attrition. Such inks are uniformly pale until exposed to the air for some days, when they acquire their full color. When the iron is at the maximum of oxidizement, as is the case when calcined copperas is employed, the ink writes of a full black at first, but from its coloring matter being merely a suspended precipitate, it rests upon the surface of the paper without sinking into it, and may consequently be more easily erased than the former. Its black color is also more liable to fade

The very general use of steel pens has caused a corresponding demand for easy flowing inks, many of which have been of late years introduced under the title of "*writing fluids*," or "*steel-pen ink*." These are mostly prepared from galls in the preceding manner, but a less quantity of gum is employed. The blue writing fluids which either maintain their color or turn black by exposure, are prepared from the ferrocyanide of potassium, or from indigo. (See Writing Fluids.)

INKS, BLUE. *Syn.* Blue Writing Fluids. *Prep.* I. Indigo dissolved in oil of vitriol, and added to water until a proper shade of color is produced, as much potash or soda being also added as the liquid will bear without dropping its color.

II. Powdered Prussian blue 1 oz.; concentrated muriatic acid 1½ to 2 oz.; mix in a matrass or glass bottle, and after 24 or 30 hours, dilute the mass with a sufficient quantity of water.

III. (Mohr.) Pure Prussian blue 6 parts; oxalic acid 1 part; triturate with a little water to *a perfectly smooth* paste, then dilute with a proper quantity of soft water. Both this and the last produce a superb liquid blue, admirably calculated for writing with, when the process is properly managed and the Prussian blue *pure;* but it will not succeed with every sample of that pigment. A little gum may be added, if required, to prevent the fluid spreading on the paper.

INKS, COLORED. Inks of various colors may be made from a strong decoction of the ingredients used in dyeing, mixed with a little alum and gum arabic. Any of the ordinary water-color cakes employed in drawing, diffused through water, may also be used for colored inks.

INK, COPYING. This is prepared by adding a little sugar to ordinary black ink. Writing executed with this ink may be copied within the space of 5 or 6 hours, by passing it through a press in contact with thin unsized paper, when a reversed copy will be obtained, but which will read in proper order by holding the back of the copy towards you. Writing executed with this ink may be copied after any lapse of time, by employing damp copying paper. A warm flat-iron passed over the latter laid upon the writing, may be substituted for the use of the copying press.

INK, GOLD. *Prep.* Honey and gold leaf equal parts; grind together upon a painter's porphyry slab with a muller, until the gold is reduced to the finest possible state of division, and the mass becomes perfectly homogeneous, when it must be agitated with 20 or 30 times its weight of hot water, and then allowed to settle and the water poured off; this process must be repeated with fresh water 2 or 3 times, when the gold must be dried and then mixed up with a little weak gum water for use. The brilliancy of writing performed with this ink is considerable, and may be increased by burnishing. Gold ink may also be made by mixing precipitated gold powder with a little gum water.

INK, GREEN. *Prep.* I. (Klaproth.) Verdigris 2 oz.; cream of tartar 1 oz.; water ½ a pint; boil to one half and filter.

II. Make a strong solution of binacetate of copper in water, or of verdigris in vinegar.

INK, INDELIBLE. *Syn.* Marking Ink. Permanent Ink. *Prep.* I. Nitrate of silver ¼ oz.; hot distilled water ¾ oz.; when cooled a little, add mucilage ¼ oz., and sap green or sirup of buckthorn to color; mix well. The linen must be first moistened with "*liquid pounce*," or "*the preparation*," as it is commonly called, dried, and then written on with a clean quill pen. This ink will bear dilution if not wanted very black.

The pounce or preparation. Carbonate of soda 1 oz. to 1½ oz., water 1 pint; color with a little sap green or sirup of buckthorn.

II. (*Without preparation.*) Nitrate of silver 1 to 2 dr.; water ¾ oz.; dissolve, add as much of the strongest ammonia water as will dissolve the precipitate formed on its first addition, then further add mucilage 1 or 2 drachms, and a little sap green to color. Writing executed with this ink turns black on being passed over a hot Italian iron.

III. Terchloride of gold 1½ drachms; water 7 drs.; mucilage 1 dr.; sap green to color; mix. To be written with on a ground prepared with a weak solution of protomuriate of tin, and dried.

Remarks. The products of the first two of the above forms constitute the marking inks of the shops. They have, however, no claim to the title of "indelible ink"—"*which no art can extract without injuring the fabric*"—as is generally represented. On the contrary, they may be discharged with almost as much facility as common iron-moulds. This may be easily and cheaply effected with either chlorine or ammonia, without in the least injuring the texture of the fabric to which it may be applied. From a great number of experiments which I have lately made on the subject, I find that this kind of ink may be discharged from even the finest muslins, without impairing their quality. The only precaution required, is that of rinsing them in clean water immediately after the operation. (See Chem., i. 210.) The "*marking ink without preparation*," is also more easily extracted than that "*with preparation;*" and the former has also the disadvantage of not keeping so well as the latter, and of depositing a portion of fulminating silver, under some circumstances, which renders its use dangerous. The best marking ink made at the present day is the heraldic ink. This ink is either applied with a stamp or pen, and by the former linen may be marked with great facility and neatness.

INK, INCORRODIBLE. *Prep.* I. (Mr Close.) *a.* Powdered copal 25 grs.; oil of lavender 200 grs.; dissolve by a gentle heat, add lampblack 3 grs., indigo 1 gr.—*b.* Powdered copal 1 part; oil of lavender 7 parts; vermilion 4 parts; as last.

II. (Mr. Hausman.) Genuine asphaltum 1 part; oil of turpentine 4 parts; dissolve, and add lampblack or blacklead to bring it to a proper consistence. Resists the action of iodine, chlorine, alkalis, and acids.

III. (Sheldrake.) Asphaltum dissolved in amber varnish and oil of turpentine, and colored with lampblack.

IV. (Cooley.) Asphaltum 1 part; oil of turpentine 4 parts; dissolve, and color with printer's ink. Very permanent.

Remarks. The above are frequently called "*Indelible inks.*" They are employed for writing labels on bottles containing strong acids and alkaline solutions. The second and last are very permanent, and are capable of resisting all the opera-

odine acts upon, and colors all kinds of starch, ut the color it imparts varies with the different inds. Thus the vapor of iodine colors—

Wheat-starch, violet.

Potato-starch, dove gray.

Genuine arrow-root, bright chocolate color.

Genuine tapioca, unbroken, uniformly yellowish.

Ditto, powdered, chamois color.

White sago, entire, some granules violet gray, thers yellowish.

Ditto, powdered, chamois color.

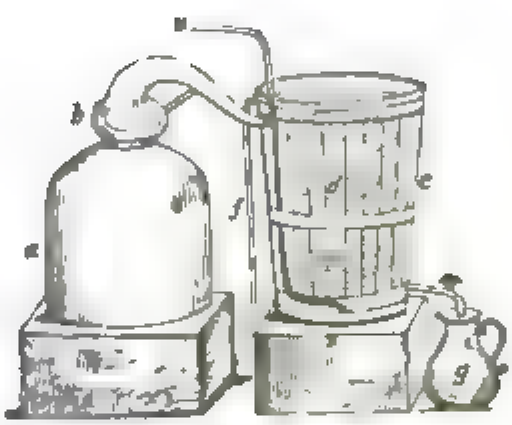
Dextrine, no coloring.

This method, at all events, renders the detecon of potato-starch very easy, and also whether common or potato starch is substituted for tapioca owder, and probably some modification of it will ender it still further applicable. (Jour. de Pharm., ipril, 1844.)

STEARIC ACID. *Syn.* STEARINE. HYDROMARGARULIC ACID. *Prep.* I. (*Commercial.*) Talow is boiled in large wooden vessels, by means f high-pressure steam, with about 16⅔ of hydrate f lime (eq. to 11⅔ of pure lime) for 3 or 4 hours ill the combination is complete, when the whole s allowed to cool. The stearate of lime is then ransferred to another wooden vessel, and decomposed, by 4 parts of oil of vitriol diluted with water, for every 3 parts of slaked lime employed, the action being promoted by steam heat. After repose the liberated fat is decanted from the sediment of sulphate of lime and water, and is well washed with water, and by blowing steam into it; t is next reduced to shavings by means of a number of knives worked by machinery, and in this divided state is placed in canvass bags and submitted to the action of a powerful hydraulic press, which expels a large portion of the oleine; the pressed cakes are then a second time exposed to he action of steam and water, again cooled and coarsely powdered, and again submitted to the joint action of steam and pressure; they are lastly melted and cast into blocks for sale.—2. (*Pure.*) Repeatedly crystallize commercial stearic acid from hot alcohol, till its melting point becomes constant at 167°. Brilliant pearly scales, soluble n ether and hot alcohol, and forming salts called *stearates* with the bases. The commercial acid s used to make candles.

STEAROPTENE. The name given by Herzerger to the concrete portion or camphor of volatile oils. Bizio calls it *stereusin.*

STILL. (From *stillare*, to drop.) A vessel r apparatus employed for the distillation of liquids n the large scale. The forms of stills, and the materials of which they are made, vary according o the purposes for which they are intended. The ollowing figure represents the most common and useful apparatus of this kind. After the fluid is ut into the still, the head must be placed on and connected with the refrigerator, and the joints must be all securely luted. For ordinary liquids, . stiff paste made with linseed meal and water, to which a little chalk may be added, will answer well for this purpose. The worm tub should be supplied with cold water in sufficient quantity to preserve its contents at a proper temperature; and the application of heat should be so regulated hat the liquid may drop from the end of the refrigerator quite cold and unaccompanied with vapor.



a, Body of still, which may be either placed in a steam jacket, or in a brick furnace.
b, Still head or capital.
c, Worm tub.
d, Pewter worm, or refrigerator.
e, Cold water pipe.
f, Waste pipe.
g, Receiver.

STRAINED GALBANUM. This is either prepared by boiling the gum resin in water until dissolved, then straining it through a canvass or hair sieve and evaporating; or by melting it in the dry state by heat cautiously and quickly applied, and straining it through a piece of coarse canvass stretched across a frame. (See FILTRATION.) The STRAINED GALBANUM of the shops is mostly *reduced* with inferior drugs, and very frequently a *factitious article* is substituted. The following forms are those which are frequently employed in the wholesale trade:—

1. (*Reduced Strained Galbanum.*)—*a.* True galbanum 9 lbs.; strain as above, and when nearly finished, add black resin (clean) 3 lbs.; Venice turpentine 2 lbs.; mix well. *Product.* 12 lbs.—*b.* True strained galbanum and black resin, of each, 6 lbs.; strained assafœtida 1½ oz.; mix, and add Venice turpentine 3 lbs. *Product.* 14½ lbs.

2. (*Factitious Strained Galbanum.*) Black resin 4 lbs.; Venice turpentine 3 lbs.; strained assafœtida 2 oz.; oils of juniper and fennel, of each, ½ oz.; water ½ pint; mix s. a. The small and waste of the galbanum chests are also usually boiled up, strained, evaporated, and added to the above to improve them.

STRAPPING. Spread adhesive-plaster. *Used* to dress wounds, &c.

STRAW PLAIT *is bleached* by exposing it to the fumes of burning sulphur in a close chest or box, or by immersing it in a weak solution of chloride of lime, and afterwards washing it well in water. Water strongly acidulated with oil of vitriol or oxalic acid, is also used for the same purpose. Straw may be *dyed* with any of the simple liquid dyes.

STRONTIA. *Syn.* STRONTIAN. STRONTITES. OXIDE OF STRONTIUM. The oxide of a metal called strontium. It greatly resembles baryta. Hydrate of strontia is freely soluble in boiling water, and the saturated solution deposites crystals on cooling The solution exhibits an alkaline reaction, and like baryta is precipitated white by sulphuric acid, and the alkaline sulphates and carbonates. It is distinguished from baryta by its inferior solubility

tion of poisonous or infectious matter into any part of the body for the purpose of propagating a mild form of disease, and thus preventing or lessening the virulence of future attacks. The word is generally applied to the insertion of the virus of the common smallpox, by which a milder form of the disease is produced, than when it is caught in the natural way. Vaccination has now very generally superseded inoculation.

Oper. Inoculation is performed by inserting the point of a lancet wetted with smallpox matter under the cuticle, and afterwards gently rubbing the moistened point over the scratch.

INULIN. *Syn.* ALANTIN. MENYANTHIN. ELECAMPIN. DAHLIN. DATISCIN. A peculiar starch-like substance first obtained by Rose from the inula helenium or elecampane. It may be obtained by boiling elecampane in 4 times its weight of water, and allowing the decoction to repose for a short time. It is distinguished from starch by the precipitate formed in the cold decoction by an infusion of gall nuts, not disappearing until the liquid is heated to above 212°, while the precipitate from starch redissolves at 122° F. Inulin is soluble in boiling water, but separates as the liquid cools.

IODATE. *Syn.* IODAS, (*Lat.*) A compound formed of iodic acid and a base in definite proportion. The iodates resemble the chlorates of the corresponding bases. They may be easily recognised by the development of free iodine when treated with sulphurous, phosphorous, and hydrochloric acids, and other deoxydizing agents, and by their solutions being converted into iodides when treated with sulphureted hydrogen. They are all of sparing solubility, and many are quite insoluble in water. All the insoluble iodates may be obtained from the iodate of potassa, by decomposing it in solution by a solution of a soluble salt of the base.

IODATE OF MERCURY. *Syn.* HYDRARGYRI IODAS. *Prep.* Precipitate a solution of mercury in nitric acid with another of iodate of potassa. A yellow powder resembling Turpeth's mineral.

IODATE OF POTASSA. *Syn.* POTASSÆ IODAS. *Prep.* I. Neutralize a hot solution of potassa with iodine, evaporate to dryness by a gentle heat, powder, and digest in alcohol, to dissolve out the iodide of potassium, then dissolve the residue in hot water and crystallize.

II. (M. Henry, jun.) Iodide of potassium 2 parts; chlorate of potassa 3 do.; fuse the iodide of potassium in a large Hessian crucible; remove it from the fire, and add, while still fluid, successive portions of the powdered chlorate of potassa, stirring well after each addition. When the matter ceases to froth up, cool, powder, and digest in tepid water to dissolve out the chloride of potassium, when the residue may be dissolved in hot water and crystallized.

Remarks. Iodate of potassa has been recommended in bronchocele. A biniodate and teriodate of potassa may also be formed, but possess little interest.

IODATE OF SILVER. *Syn.* ARGENTI IODAS. *Prep.* From a solution of nitrate of silver, as Iodate of Mercury. A white powder, soluble in ammonia.

IODIC ACID. *Syn.* OXIODINE. ACIDUM IODICUM. An acid compound of iodine and oxygen discovered by Gay Lussac and Davy.

Prep. I. Dissolve iodate of soda in sulphuric acid in considerable excess, boil for 15 minutes, and set the solution aside to crystallize. *Pure.*

II. (M. Boursen.) Iodine 1 part; *strongest* (monohydrated) nitric acid 4 parts; mix, and apply a gentle heat until the color of the iodine disappears, then evaporate to dryness and leave the residuum in the open air at a temperature of about 15° C. When by attracting moisture it has acquired the consistence of a sirup, put it into a place where the temperature is higher and the air drier, when in a few days very fine white crystals of rhomboidal shape will form. (Compt Rend. xxiv.) *Pure.*

III. (J. L. Lassaigne.) Treat a solution of nitrate of silver with an excess of iodine, filter, evaporate to dryness, and proceed as last. *Pure.*

IV. Diffuse iodine in powder through distilled water, then pass a current of chlorine through the liquid; evaporate.

Remarks. Iodic acid is decomposed into oxygen and iodine by a heat of about 450 to 500° F. It is very soluble in water and deliquescent; it detonates with inflammable bodies like the nitrates and chlorates; with the bases it forms salts called IODATES. The IODATE OF SODA above alluded to may be made in the same way as the iodate of potassa. Iodic acid is used as a test for morphia and sulphurous acid. (See IODATE.)

IODIDE. *Syn.* IODURE. IODURET. HYDRIODATE. IODIDUM; IODURETUM; HYDRIODAS, (*Lat.*) A compound of iodine and a base.

IODIDE OF ARSENIC. *Syn.* ARSENICI IODIDUM. *Prep.* (Wackenroder.) Sublimed metallic arsenic 1 gr.; pure iodine 6 grs.; water 2 drachms; digest together, evaporate by a gentle heat, and as soon as the mass begins to solidify, the temperature must not exceed 86° F. A red crystalline mass is obtained. (See p. 74.)

IODIDE OF ARSENIC, SOLUTION OF. *Prep.* (Wackenroder.) Dissolve the product of the above process in water 6 oz.; every drachm of which will contain one-forty-eighth gr. of metallic arsenic, and one-tenth gr. (nearly) of iodine.

IODIDE OF CYANOGEN. *Prep.* (Mitscherlich.) Gently heat a mixture of bicyanide of mercury, iodine, and water, in a retort, when iodide of cyanogen will sublime and collect in the neck of the retort, under the form of a crystalline snow or needles. It volatilizes at 100° F., and is soluble in water, ether, and alcohol.

IODIDE OF NITROGEN. *Syn.* TERIODIDE OF NITROGEN. A dark powder, which subsides when iodine is put into liquor of ammonia. It may be more safely and conveniently made by saturating alcohol of sp. gr. ·852 with iodine, adding a large quantity of ammonia, and agitating the mixture; water must now be added, when the iodide will be precipitated, and must be carefully washed with cold distilled water. *** It detonates violently as soon as it becomes dry, and by slight pressure, or friction, even when moist. It should only be prepared in very *small quantities* at a time.

IODIDES OF PHOSPHORUS. *Prep.* I. (*Protiodide.*) Phosphorus 1 part; iodine 7 parts; mix in a close vessel, placed in a freezing mixture

Orange colored; melts at 212°; volatile, and decomposed by water.

II. (*Sesquiodide.*) Phosphorus 1 part; iodine 12 parts; as last. A dark gray semi-crystalline mass, liquid at 84° F.

III. (*Periodide.*) Phosphorus 1 part; iodine 20 parts; as last. A black mass, fusible at about 115° F. All the above yield hydriodic acid and phosphorous or phosphoric acid, by contact with water.

IODIDE OF SULPHUR. *Syn.* Sulphuris Iodidum. *Prep.* Iodine 4 parts; sulphur 1 part; place the mixture in a loose-corked flask, immerse it in a water bath, and, as soon as it melts, stir it with a glass rod, then place in the cork, remove the bath from the fire, and let the two cool together. When cold, break the iodide into pieces, and place it in a wide-mouthed stoppered bottle. In this way a beautiful semi-crystalline, dark gray mass, resembling antimony, is obtained.

Remarks. An ointment made with 5 parts of iodide of sulphur, and 96 of lard, or 8 of the iodide and 144 of lard, has been recommended by Biett in tuberculous affections of the skin. Iodide of sulphur stains the skin like iodine, and is readily decomposed by contact with organic substances.

IODIDE OF STARCH. *Syn.* Amyli Iodidum. *Prep.* (Dr. Buchanan.) Iodine 24 grs.; water q. s.; triturate; then add starch ℥j; again triturate, until the mass assumes a uniform color. One of the most worthless of the preparations of iodine.

IODIDES, DOUBLE. Several of these compounds have been described by Bonsdorff, Boullay, and Liebig, many of which are formed by dissolving the iodides in a solution of iodide of potassium, when crystals of the double salt are deposited as the liquid cools, or on evaporation. They possess but little interest in a practical point of view.

IODINE: *Syn.* Iode, (*Fr.*) Iod, (*Ger.*) Iodium; Iodinium; Iodina, (*Lat.*, from ιωδης, *violet colored*, on account of the color of its vapor.) A chemical element, accidentally discovered in 1812, by De Courtois, a saltpetre manufacturer at Paris, but was first described by Clement, in 1813, and its precise nature was soon afterwards determined by Sir H. Davy and M. Gay Lussac. It is found both in the animal, vegetable, and mineral kingdoms, but exists in greatest abundance in the vegetable family algæ. It is principally manufactured in the neighborhood of Glasgow, from the mother waters of kelp.

Prep. I. Extract all the soluble part of kelp by water, and crystallize the soda by evaporation; to the mother lye add oil of vitriol in excess and boil the liquid, then strain it to separate some sulphur, and mix the filtered liquor with as much manganese as there was oil of vitriol used: on applying heat, the iodine sublimes in the form of grayish black scales, with a metallic lustre. The boiling is conducted in a leaden vessel; and a cylindrical leaden still, with a *very short* head, and connected with 2 or 3 large globular glass receivers, is used for the subliming apparatus. Care must be taken to watch the process, and prevent the neck of the still becoming choked with condensed iodine.

II. (Ure.) Saturate the residual liquor of the manufacture of soap from kelp, of the sp. gr. of 1·374, heated to 230° F., with sulphuric acid diluted with half its weight of water, cool, decant the clear, strain, and to every 12 fluid ounces add 1000 grs. of black oxide of manganese, in powder; put the mixture into a glass globe, or matrass with a wide neck, over which invert another glass globe, and apply heat with a charcoal chauffer; iodine will sublime very copiously, and condense in the upper vessel, which as soon as warm should be replaced by another; and the two globes thus applied in succession, as long as violet vapor arises. It may be washed out of the globes with a little cold water. A thin disc of wood, having a hole in its centre, should be placed over the shoulder of the matrass, to prevent the heat from acting on the globular receiver. On the large scale, a leaden still, as before described, may be employed, and receivers of stoneware economically substituted for glass ones. The addition of the sulphuric acid should be made in a wooden or stoneware basin or trough. *Prod.* 12 oz. yield 80 to 100 grs.

III. (Soubeirau.) Add a mixed solution of 1 part of sulphate of copper and 2¼ parts of protosulphate of iron to the mother liquors of the soda works, as long as a white precipitate is thrown down; the precipitate (diniodide of copper) must be then collected, dried, mixed with its own weight of finely-powdered black oxide of manganese, and distilled by a strong heat in a retort; dry iodine will pass over. By the addition of sulphuric acid with the manganese, a less heat is required.

Remarks. The top of the leaden still employed for the preparation of iodine, is usually furnished with a moveable stopper, by which the process may be watched, and additions of manganese or sulphuric acid made, if required. To render it pure, it should be dried as much as possible, and then resublimed in glass or stoneware.

Prop. Iodine is usually met with under the form of semicrystalline lumps, having a metallic lustre, or in micaceous, friable scales, somewhat resembling gunpowder. It has a grayish-black color, a hot acrid taste, and a disagreeable odor, not much unlike that of chlorine. It fuses at 225° F., volatilizes slowly at ordinary temperatures, boils at 347°, and when mixed with water rapidly rises along with its vapor at 212°. It dissolves in 7000 parts of water, and freely in alcohol and ether. It may be crystallized in large rhomboidal plates, by exposing to the air a solution of it in hydiodic acid. Iodine, like chlorine, has an extensive range of affinity; with the salifiable bases, it forms compounds termed *Iodides*, *Iodurets*, or *Hydriodates*; and it destroys vegetable colors. Many of the iodides are used in medicine.

Pur. The iodine of commerce is usually that of the first sublimation, and commonly contains 12 to 20% of water. Some of the foreign iodine, obtained by precipitation with chlorine, without subsequent sublimation, frequently contains ¼th water, has a leaden-gray color, and a sensible odor of chlorine. Coal, plumbago, oxide of manganese, crude antimony, and charcoal, are also frequently mixed with it. *Water* may be detected by the loss of weight it suffers when exposed to strong pressure between the folds of bibulous paper,—*chlorine*, by the odor, and the other substances

mentioned above, by digestion in spirits of wine, when the iodine will dissolve, leaving the impurities behind. Before use as a medicine, "it must be dried, by being placed in a shallow basin of earthenware, in a small confined space of air, with 10 or 12 times its weight of fresh-burnt lime, till it scarcely adheres to the side of a dry bottle." Pure iodine "is entirely vaporizable; 39 grs., with 9 grs. of quicklime, and ℥iij of water, when heated short of ebullition, slowly form a perfect solution, which is *yellowish* or *brownish*, if the iodine be *pure*, but colorless, if it contains more than 2§ of water, or other impurity." (P. E)

Uses, Dose, &c. Iodine is chiefly used as a medicine, and a chemical test. Its physiological action, when applied externally, is that of an irritant, and, when swallowed in large doses, it produces powerful gastric irritation. In small doses, it appears to be both alterative and tonic, rapidly diffusing itself through the body, and exerting a stimulating action on the organs of secretion. It is also said to be diuretic, and in some cases to have produced diaphoresis and salivation. It exerts a powerful anti-aphrodisiac action, and instances are recorded where absorption of the mammæ and testæ have followed its exhibition. (Hufeland's Journal.) *Dose.* ½ gr. dissolved in spirit, or in water, by means of an equal weight of iodide of potassium. It is seldom exhibited alone, being usually combined with the latter substance, and in fact this salt is now generally preferred by practitioners. Iodine, in medicinal doses, has been exhibited in the following diseases, as well as in most others depending on an imperfect action of the absorbents, or accompanied by induration or enlargement of individual glands or organs:—Internally, in *bronchocele, goitre, Derbyshire neck, scrofula, ovarian tumors, enlargement or induration of the lymphatic, prostate, and parotid glands, amenorrhœa, leucorrhœa, diseases of the muco-genital tissues, phthisis, chronic nervous diseases, lepra, psoriasis, chronic rheumatism, dropsies, hydrocele, &c.*:—Externally, in *scrofula, numerous skin diseases, (especially the scaly,) erysipelas, diseased joints, chilblains, burns, scalds, various wounds, to check ulceration, to promote absorption, &c.* It is applied externally in the form of ointment, solution, or tincture.

Tests. Free iodine may be recognised by—1. The violet color of its vapor.—2. Striking a blue color with starch: this test is so delicate that water containing only $\frac{1}{450000}$ part of iodine, acquires a perceptible blue tinge on the addition of starch. (Stromeyer.)—3. Nitrate of silver causes a white precipitate in solutions containing iodine.—4. Chloride of palladium causes a black, flaky precipitate; equal in sensibility to starch. (M. Bauman.)—5. It strikes a blue color with opium and narceine.

Iodine in combination, as it exists in iodic acid and the *iodates*, does not strike a blue color with starch, without the addition of some deoxydizing agent, as sulphurous acid or morphia; and as it exists in the *iodides*, not until the base is saturated with an acid, (as the sulphuric or nitric,) when iodine being set free, immediately reacts upon the starch An excess of either acid or alkali destroys the action of the test. By mixing the liquid containing the iodine with the starch and sulphuric acid, and lightly pouring thereon a small quantity of aqueous chlorine, a very visible blue zone will be developed at the line of contact. (Balard.)

Solutions containing iodates yield, with nitrate of silver, a white precipitate soluble in ammonia; the *iodides*, under the same circumstances, give a pale yellowish precipitate with nitrate of silver, scarcely soluble in ammonia; a *bright yellow* one with acetate of lead; and a *scarlet* one with bichloride of mercury. The *iodates* deflagrate when thrown on burning coals, but the *iodides* do not. The *iodates* may also be tested as iodides, by first heating them to redness, by which they lose their oxygen, and are converted into iodides.

IODINE, CHLORIDES OF. When dry chlorine is passed over dry iodine, at common temperatures, heat is evolved, and a solid chloride results. It is orange-yellow when the iodine is fully saturated, and reddish orange when the iodine is in excess. It deliquesces in the air, is volatile, and very soluble in water, forming a colorless solution, which exhibits acid properties. It is the *chloriodic acid* of Sir H. Davy. The *protochloride of iodine* is formed when chlorine is passed into water holding iodine in suspension, and the *perchloride* by repeatedly distilling the protochloride, or by adding to a solution of the latter a strong solution of corrosive sublimate. The latter is also called the *terchloride*.

IODOSALICULIC ACID. A dark brown fusible mass, obtained by distilling a mixture of iodide of potassium and chloro-saliculic acid; or by dissolving iodine in saliculic acid.

IODO-SULPHURIC ACID. *Prep.* Drop sulphuric acid into a hot concentrated aqueous solution of iodic acid, as long as a precipitate falls. When strongly heated, it sublimes, and is decomposed, but by means of a gentle heat, gradually applied, it melts, and crystallizes in yellow rhomboids as it cools. In a similar manner may be formed *iodo-phosphoric* and *iodonitric acids*. All these act with great energy on the metals, and dissolve gold and platinum.

IODOUS ACID. *Prep.* (Sementini.) Chlorate of potassa and iodine, equal parts; triturate together, until reduced to a homogeneous yellow mass; then heat the mixture over a spirit-lamp, in a glass retort connected with a spacious receiver, until vapors cease to arise. The oily liquid in the receiver is the iodous acid.

II. (Pleischl.) Chlorate of potash 3 parts; iodine 1 part; as last.

Remarks. Iodous acid, or oxide of iodine, reddens test papers, is volatile at 112° F., and freely dissolves iodine. Little is known respecting its precise composition. (See Iodic Acid.)

IODURETED IODIDE OF POTASSIUM. Iodine dissolved in a solution of iodide of potassium. Various strengths are employed by different authorities. (See Solutions.)

IRIDIUM. (From Iris, *the rainbow*, because of the variety of colors exhibited by its solutions.) A rare metal, discovered by Descotils in 1803, and by Tennant in 1804, in the black powder left in dissolving platina. It is obtained in combination with osmium.

Prep. (Wollaston.) Reduce the pulverulent residue of the ores of platina to fine powder, along with ½ of its weight of nitre, and heat the mixture

to redness in a silver crucible, until reduced to a pasty state, and the odor of oxide of osmium becomes perceptible; cool, powder, agitate with the smallest possible quantity of water, place the solution in a retort, acidulate with oil of vitriol diluted with an equal weight of water, and distil rapidly into a clean receiver, as long as fumes of *osmic acid* pass over and condense as a white crust on the sides of the vessel, afterwards liquefying, and sinking beneath the water, forming a flattened globule. By solution in water, agitation with mercury, and the addition of muriatic acid, *osmium* is obtained as a black porous powder, which exhibits a metallic lustre when rubbed. The undissolved portion must now be digested in muriatic acid, and the solution treated with any metal but gold or platinum, when the *iridium* will be precipitated.

Prop., &c. Brittle, pulverulent, and when polished, resembling platinum. It is the heaviest, hardest, most infusible, indestructive, and least affected by acids, of all the metals. With chlorine, iridium forms four compounds:—the *protochloride*, formed by transmitting chlorine over powdered iridium, heated to a dull red, or by digesting the hydrated protoxide in muriatic acid;—the *sesquichloride*, by calcining iridium with nitre, digesting in nitric acid, washing with water, and solution in hydrochloric acid;—the *bichloride*, by digesting the sesquichloride in hot nitro-muriatic acid;—the *terchloride*, obtained as a double chloride of potassium. With oxygen, iridium forms a *protoxide*, *sesquioxide*, and *teroxide*, each of which may be obtained by precipitating a solution of the corresponding chloride with an alkali.

IRIDIO-CHLORIDES. Double salts, formed of the chlorides of iridium with other chlorides. Some of them are crystallizable and soluble.

IRON. *Syn.* FERRUM, (*Lat.*) FER, (*Fr.*) EISEN, (*Ger.*) FERRO, (*It.*) FERRO, (*Port.*) HIERRO, (*Sp.*) JERN, (*Dan. & Swed.*) IJZER, (*Dut.*) MARS, (*Alch.*) The early history of iron is lost in its antiquity. It is said to have been employed as a medicine upwards of 3200 years ago. As a remedial agent, when properly exhibited, it acts as a genial stimulant and tonic, and generally proves beneficial in cases of chronic debility, unaccompanied with organic congestion or inflammation. For this purpose, the protoxide or its salts should alone be employed, as the peroxide and its salts act, almost universally, as irritant stimulants, occasioning heartburn, febrile symptoms, and accelerated pulse. The powers of the protocarbonate, as it exists in mineral waters, held in solution by carbonic acid in excess, appears to be the form most congenial to the human body; and from its state of dilution, "is rapidly absorbed by the lacteals, and speedily imparts a ruddy hue to the wan countenance." Iron is undoubtedly one of the most valuable articles of the materia medica, and appears, from the antiquity of its introduction into medicine, and the number of its preparations, to have been deservedly appreciated. It bears the recommendation of upwards of 3000 years upon its brow, and surely a medicine that hath withstood such vicissitudes, *cannot* be *destitute* of *virtue.*

Prep. Iron is only prepared on the large scale. In Sweden it is extracted from magnetic iron, and micaceous iron ore; and in England, principally from clay iron ore. It is obtained by smelting the ore along with coke and a flux, (either limestone or clay.) The crude iron thus obtained is run into moulds, and then constitutes CAST IRON or PIG IRON, (*ferrum fusum.*) By the subsequent process of refining, (puddling, welding,) it is converted into SOFT IRON or WROUGHT IRON, (*ferrum cusum.*)

Prop. & Uses. The properties and uses of iron are too well known to require description. Its applications in almost every branch of human industry, are almost infinite. It is remarkably ductile, and possesses great tenacity, but it is less malleable than many of the other metals. Its sp. gr. is 7·788. It is the hardest of all of the malleable and ductile metals, and when combined with carbon or silica, (steel,) admits of being tempered to almost any degree of hardness or elasticity. IRON-FILINGS, (*ferri limaturæ,*) IRON-TURNINGS, (*ferri ramenta, ferri scobs,*) and IRON-WIRE, (*ferri filum,*) are the forms under which iron is ordered in the pharmacopœias. The last is only used in preparations, but the others are also taken. *Dose.* Of the filings 5 to 10 grs., in chlorosis, &c. For medical purposes, iron-filings and turnings should be purified by washing, drying, and separating them from particles of copper and other metals, by laying a sieve over them, and drawing them through it with a magnet.

Tests. 1. Metallic iron is attracted by the magnet. 2. It dissolves in muriatic and sulphuric acids, with the evolution of hydrogen gas. 3. Its oxides are also soluble in the acids. 4. The solutions of iron (ferruginous salts) yield a greenish white precipitate, subsequently turning red or brown, when treated with alkalis. 5. Aurochloride of sodium gives a purple precipitate with solutions of the protosalts of iron, and red prussiate of potash a blue one. 6. Prussiate of potash, under like circumstances, gives a pale blue one, or a full blue, if a little nitric acid has been previously added. The protosalts may thus be all converted into persalts, and tested accordingly. 7. The persalts of iron yield a blue precipitate with *yellow* prussiate of potash, but are unaffected by the red prussiate; sulphocyanic and meconic acids strike a red color; gallic acid, tannic acid, and infusion or tincture of galls, a bluish black; succinate and benzoate of ammonia, a yellowish one; citric acid or a citrate, a pale red color, (transparent.) 8. Cochineal freed from fat by ether, and then digested in water, (or very weak spirit,) gives a solution which is colored violet by the protosalts of iron. (Kastner.) 9. Hydrosulphuret of ammonia gives a black precipitate. 10. Phosphate of soda precipitates the persalts white, and the protosalts blue.

IRON, ACETATE OF. ACETATE DE FER, (*Fr.*) ACETATO DI FERRO, (*Ital.*) FERRI ACETAS, (*Lat.*) *Prep.* I. (P. D.) Sesquioxide of iron 1 part; acetic acid 6 parts; digest 3 days and filter. Tonic. *Dose.* 10 to 25 drops in water or wine. This preparation is a mixture of the proto- and per-acetate of iron.

II. (*Pyrolignite of iron. Iron liquor. Dyer's acetate of iron.*) *Prep. a.* (Prof. Runge.) Eight suitable vessels are arranged one above another, like a staircase, so that the top of the upper one may rest over the one immediately below it, and so on of the others to the bottom one. The eight

vessels are now filled with old scraps of iron, and the upper one with pyroligneous acid; after half an hour this is drawn off into the vessel next below it, and this again, after the lapse of another half hour, into the *third*, and so on until the last is emptied. The acid is now passed a second time through the vessels in the same way as before, and thus becomes more strongly impregnated with iron in a less time than by *any other* means, except the following:—

b. (Dr. Winterfield.) This consists in employing several wooden cylinders, resembling those used in the quick process of making vinegar; the space between the two perforated bottoms, usually filled with wood shavings, being occupied with scraps of iron. Pyroligneous acid is then passed through them, and the same system of ventilation observed as in the manufacture of vinegar. (Gewerbe-Blatt f. Sachsen.)

c. Leave old scraps of iron in a cask of vinegar, or pyroligneous acid, and employ occasional agitation, until a sufficiently strong solution is obtained. When the deposite of tar on the iron hinders the solution, it may be burnt off.

d. Add a solution of acetate of lime to another of green copperas, as long as a precipitate is formed; decant.

III. (*Protacetate.*) Dissolve freshly precipitated protoxide or carbonate of iron in acetic acid, or add a solution of acetate of lime to another of protosulphate of iron, and evaporate out of contact with the air. Small green prismatic crystals.

IV. (*Sesquiacetate. Peracetate.*) Dissolve hydrated peroxide of iron in acetic acid, or precipitate a solution of acetate of baryta by another of persulphate of iron. Uncrystallizable.

Remarks. All the above, prepared with crude materials, are used as mordants by the dyers.

IRON, ARSENITE OF. *Prep.* I. (*Protarsenite. Ferri arsenias.*) Precipitate a solution of protosulphate of iron with another of arsenite of soda or ammonia; wash and dry. A yellowish brown powder, used in medicine as a tonic, alterative, and febrifuge.

II. (*Perarsenite. Sesquiarsenite.*) Prepared by precipitating peracetate of iron with arsenite of ammonia, or by boiling nitric acid on the protarsenite.

Remarks. The *arseniates* of the iron may be formed in a similar way, from the arseniate of soda or ammonia.

IRON, ALBUMINATE. *Prep.* I. (Lassaigne.) Precipitate a filtered solution of white of egg with another of persulphate of iron, wash the deposite in water, and dissolve it in alcohol, holding caustic potassa in solution.

II. (Cooley.) Dissolve well washed hydrated protoxide or peroxide of iron in white of egg, diluted with twice its weight of water, and filtered.

Remarks. As a therapeutic agent, the albuminate of iron is highly spoken of by M. Lassaigne and other high authorities, who recommend it as a preparation especially adapted by its nature, on theoretical grounds, for combining with the tissues of the body. It will no doubt, ere long, take a prominent situation among the most esteemed of our chalybeates.

IRON, AMMONIO-CHLORIDE OF. *Syn.* FERRO-CHLORIDE OF AMMONIA. AMMONIATED IRON. ENS VENERIS BOYLEI. ENS MARTIS, (P. L. 1720.) FLORES MARTIALES, (P. L. 1775.) FERRUM AMMONIACALE, (P. L. 1788.) FERRUM AMMONIATUM, (P. L. 1809 and 1824.) FERRI AMMONIO-CHLORIDUM, (P. L. 1836.) FLORES SALIS AMMONIACI MARTIALIS. MURIAS FERRI ET AMMONIÆ. *Prep.* I. (P. L.) Sesquioxide of iron ℥iij; muriatic acid ½ pint; digest in a proper vessel in a sand-bath for 2 hours, then add sal ammonia lb. iiss, dissolved in water 3 pints; filter, evaporate to dryness, and reduce the mass to coarse powder. Orange-colored crystalline grains.

II. Rub sal ammoniac with twice its weight of colcother or rust of iron, sublime with a quick sudden heat, and repeat the sublimation with fresh sal ammoniac as long as the flowers are well colored. Difficult to manage.

Remarks. Ammonio-chloride of iron "is totally soluble in proof spirit and in water. Potassa added to the solution throws down sesquioxide of iron, and when added in excess, evolves ammonia." (P. L.) Tonic. Emmenagogue and aperient. *Dose.* 5 to 15 grs. in glandular swellings, obstructions, &c.

IRON, AMMONIO-TARTRATE OF. *Syn.* AIKIN'S AMMONIO-TARTRATE OF IRON. TARTRATE OF IRON AND AMMONIA. FERRO-TARTRATE OF AMMONIA. AMMONIÆ FERRO-TARTRAS, &c. *Prep.* Tartaric acid 1 part; iron filings 3 parts; digest in a sufficient quantity of hot water to barely cover the mixture for 2 or 3 days, observing to stir it frequently, and to add just enough water to allow the evolved gas to escape freely; then add some liquor of ammonia, and continue the stirring; dilute with water, decant, wash the undissolved portion of iron, filter the mixed liquors, and evaporate to dryness; redissolve in water, add a little more ammonia, filter, and again gently evaporate to dryness, or to the consistence of a thick sirup, when it may be spread upon hot plates of glass, or on earthenware dishes, and dried in a stove-room, as directed for citrate of iron.

Remarks. Glossy, brittle lamellæ, or irregular pieces, deep garnet-colored, almost black, very soluble in water, and possessing a sweetish and slightly ferruginous taste. By repeated re-solution and evaporation its sweetness is increased, probably from the conversion of a part of its acid into sugar. It contains more iron than a given weight of the sulphate of the same base. It is the most pleasant-tasted of all the preparations of iron, except the ammonio-citrate. (Aikin, Lond. Med. Gaz.)

IRON, BENZOATES OF. Prepared by digesting the hydrated oxides in a hot solution of the acid, or from the benzoate of an alkali and a salt of iron by double decomposition.

IRON, BRONZING OF. (See BROWNING OF GUN BARRELS, and BRONZING.)

IRON, CARBONATE OF. *Syn.* FERRI CARBONAS. This preparation is found in a crystallized state in the mineral called *Spathose iron*, and in some chalybeate waters.

Prep. Precipitate protosulphate of iron by adding a solution of carbonate of soda, well wash the green powder with water and dry it out of contact with the air. On the slightest exposure it is converted into *sesquioxide of iron.*

IRON, CARBONATE, (SACCHARINE.) *Syn.* KLAUER'S FERRUM CARBONICUM SACCHARATUM. FERRI CARBONAS SACCHARATUM. *Prep.* (P. E.) Sulphate of iron ℥iv; carbonate of soda ℥v; dissolve each separately in water 1 quart, mix the solutions, collect the precipitate, well wash it with cold water, drain on a cloth, squeeze out as much of the water as possible, and add powdered lump sugar ℥ij; mix and dry at a temperature not much above 120° F. The whole operation should be performed as quickly as possible. A sweet-tasted greenish mass or powder, consisting chiefly of carbonate of iron. It is one of the best of the chalybeates. *Dose.* 5 to 10 grs. When pure it should be "easily soluble in muriatic acid with brisk effervescence." (P. E.)

IRON, CHLORIDE OF. *Syn.* FERRI CHLORIDUM. *Prep.* I. (*Protochloride.*) Dissolve iron filings or scales in muriatic acid, evaporate and crystallize. Soluble, green crystals.

II. (*Perchloride. Sesquichloride.*) Dissolve sesquioxide or rust of iron in muriatic acid, evaporate to the consistence of a sirup, and crystallize. Red crystals.

Remarks. Neither of the preceding is absolutely pure; but by transmitting dry hydrochloric acid gas over iron heated to redness, a pure white crystalline PROTOCHLORIDE OF IRON is obtained; and by the combustion of iron wire in chlorine gas, or by passing chlorine over heated iron, the pure PERCHLORIDE OF IRON is formed. The *protochloride* is volatile at high temperatures, and the *perchloride* is dissipated by a heat a little above 212° F. The latter is soluble in water, alcohol, and ether, and is deliquescent. (See TINCT. OF SESQUICHLORIDE OF IRON.)

IRON, IODIDES OF. *Prep.* I. (*Protiodide of Iron. Iodide of do. Ioduret of do. Ferri Iodidum*, P. L. *Ferri Ioduretum.*) *a.* (P. L.) Iodine ℥vj; iron filings ℥ij; water 4½ pints; mix, boil in a sand-bath until the liquid turns to a pale green, filter, wash the residue with a little water, and evaporate the mixed liquors in an iron vessel, at 212°, to dryness.

b. (P. E.) The Scotch college orders the solution not to be filtered until evaporated to $\frac{1}{5}$, without removing the excess of iron, and then to be filtered as quickly as possible and put into a basin, which must be surrounded with 12 times its weight of quicklime, and placed in some convenient apparatus in which it may be accurately shut in a small space not communicating with the general atmosphere. The whole must then be heated in a hot-air press, in a stove or otherwise, until the water be entirely evaporated, when the iodide of iron must be put into small dry-stoppered vials. *Product excellent.*

Remarks. A great deal has been written and said about the preparation of iodide of iron, much of which is more amusing than instructive. There is in reality very little difficulty in the process. As soon as iodine and iron are mixed together under water, much heat is evolved, and if too much water be not used the combination is soon completed, and the liquor merely requires to be evaporated to dryness, out of contact with the air, at a heat not exceeding 212°. This is most cheaply and easily performed by employing a glass flask, with a thin broad bottom and a narrow mouth, by which means the evolved steam will exclude air from the vessel. I have adopted the following formula with excellent results:—Iodine 18 oz.; iron wire or filings 6 or 7 oz.; water about 1 quart; mix in a glass or stoneware jug, agitate with an iron rod, (cautiously;) when the temperature of the liquid will rise considerably, and the combination be completed in 20 or 30 minutes, without the application of external heat. When the liquor assumes a pale green color, decant it into a glass flask with a thin bottom, wash the remaining iron with a little water, filter, and add it to that already in the flask. Apply the heat of a sand-bath, or a rose gas jet, (preferably the former,) and evaporate to the consistence of a sirup as quickly as possible, then remove the flask into a water-bath containing ⅛ salt and evaporate to dryness, observing not to stir the mass during the latter part of the process. The whole of the uncombined water may be known to be evaporated when vapor ceases to condense on a piece of cold glass held over the mouth of the flask; a piece of moistened starch paper occasionally applied in the same way, will indicate whether free iodine be evolved; should such be the case, the heat should be immediately lessened. When the evaporation is completed, the mouth of the flask should be stopped up by laying a piece of sheet Indian rubber on it, and over that a flat weight; the flask must be then removed, and when cold broken to pieces, the iodide weighed, and put into dry and warm stoppered wide-mouth glass vials, which must be immediately closed, tied over with bladder, and the stoppers dipped into melted wax.

Iodide of iron "evolves violet vapors by heat, and sesquioxide of iron remains. When freshly made it is totally soluble in water, and from this solution when kept in a badly stoppered vessel, sesquioxide of iron is very soon precipitated; but with iron wire immersed in it, it may be kept clear in a well-stoppered vessel." (P. L.) "Entirely soluble in water, or *nearly* so, forming a greenish solution." (P. E.) Its *dilute* solution should be colorless. (A. J. C.)

Dose. 1 to 3 grs. or more. It is tonic, stimulant, and resolvent, and has been given with advantage in debility, scrofula, and various glandular affections.

II. (*Periodide.*) Freely expose a solution of protiodide of iron to the air; or digest iodine in excess on iron under water, gently evaporate, and sublime. A deliquescent, volatile red compound, soluble in water and alcohol.

IRON, LACTATE. *Syn.* PROTOLACTATE OF IRON. FERRI LACTAS. *Prep.* I. (Rassman.) Boil iron filings in lactic acid diluted with water till gas ceases to be evolved, filter while hot into a suitable vessel, which must then be closely stopped; as the solution cools, crystals will be deposited, and these must be washed with a little cold water, then with alcohol, and lastly dried. The mother-liquor digested as before with fresh iron will yield more crystals. (Buchner's Rep.)

II. (Pagenstecher.) Lactate of lime prepared from sour milk is dissolved in water, and carbonate of ammonia added till it ceases to produce a precipitate; the liquid is now filtered, and concentrated by heat till it acquires the consistence of a sirup; it is then mixed with 6 times its weight of

rine gas, exhibited by adding 5 or 6 drops of aqueous chlorine to the water (tepid) of the inhaler, which should be of glass. Employed in France for phthisis, but seldom used in England. 4. *Vapor of iodine*, administered as the last, and occasionally used in phthisis. 5. *Oxygen and hydrogen gases*, alone or diluted with air, employed in asthma and phthisis, by means of a bladder and mouth-piece. 6. *Carbonic acid gas and nitrous oxide*, occasionally used as the last in phthisis.

INJECTION. *Syn.* Injectio, (*Lat.*, from *injicio*, to cast into.) Liquid medicines thrown into the cavities of the body by means of a syringe or elastic bag. Those thrown into the rectum are commonly called *clysters*, or *enemata*. (See Enema.) The following are the principal injections employed in medical practice at the present day:—

INJECTION FOR DEAFNESS. *Syn.* Injectio acoustica. *Prep.* I. Ox gall 3 dr.,; balsam of Peru 1 dr.; mix.

II. Oil of almonds or olives 2 oz.; oil of amber 20 drops; tincture of castor 1 dr.; spirit of camphor ½ dr.; laudanum 3 drops; mix.

INJECTION, LITHONTRIPTIC. *Syn.* Inj. lithontriptica. *Prep.* (Chevallier.) Carbonate of soda ʒj; Castile soap ℥ij; water f℥xij; dissolve. For calculus.

INJECTION OF ACETATE OF AMMONIA. *Syn.* Inj. Ammoniæ acetatis. *Prep.* (P. C.) Liquor of acetate of ammonia ℥j; water ℥iij; mix.

INJECTION OF ALUM. *Syn.* Inj. Aluminis. *Prep.* I. (Collier) *a.* Alum 18 grs.; rose-water f℥vj; for the urethra.—*b.* Alum ʒiij; water 1 quart; for the vagina.

II. (Brande.) Compound liquor of alum ʒvj; water f℥viss; mucilage ℥ss.

III. (P. C.) Alum 4 grs.; rose-water ℥iv. All the above are astringent.

INJECTION OF AMMONIA. *Syn.* Inj. Ammoniæ. *Prep.* (Lavagna.) Liquor of ammonia 8 to 12 drops; milk ℥ij; mix. Stimulant and emollient.

INJECTION OF BICHLORIDE OF MERCURY. *Syn.* Inj. Hydrargyri Bichloridi. Inj. Corrosivi Sublimati. *Prep.* I. (P. C.) Corrosive sulimate 8 to 12 grs.; water 1 quart.

II. (P. H.) To the last add wine of opium f℥j.

III. Corrosive sublimate 5 grs.; rose-water 2 oz. Used to promote a healthy action, and to prevent infection.

INJECTION OF CALOMEL. *Syn.* Inj. Calomelanos. *Prep.* (P. C.) Calomel ʒss; quince mucilage ℥iv.

INJECTION OF CHLORINE. *Syn.* Inj. Chlorinata. *Prep.* Liquor of chloride of soda ʒj; water ℥ij. As above.

INJECTION OF COPAIBA. *Syn.* Inj Copaibæ. *Prep.* (P. C.) Balsam of copaiba ʒij; mucilage ℥ss; lime water ℥iv; make an emulsion. Used in diseases of the mucous membranes of the urethra and vagina.

INJECTION OF ACETATE OF COPPER. *Syn.* Inj. Cupri acetatis. *Prep.* (P. C.) Verdigris 10 grs.; oil of almonds ℥iv; triturate until dissolved, then strain.

INJECTION OF ACETATE OF LEAD. *Syn.* Inj. Plumbi acetatis. *Prep.* (Collier.) Sugar of lead 40 grs.; rose-water ℥viij.

INJECTION OF AMMONIATED COPPER. *Syn.* Inj. Cupri ammoniati. Inj. Cupri ammonio-sulphatis. *Prep.* I. (P. C.) Liquor of ammonio-sulphate of copper 20 drops; rose-water ℥iv.

II. (Swediaur.) Ammonio-sulphate of copper 5 grs.; rose-water ℥viij.

INJECTION OF SULPHATE OF COPPER. *Syn.* Inj. Cupri sulphatis. *Prep.* Sulphate of copper 5 grs.; rose-water ℥iv.

INJECTION OF SULPHATE OF COPPER, (COMPOUND.) *Prep.* To the last add solution of diacetate of lead 20 drops. The above cupreous injections are all mildly detergent and escharotic.

INJECTION OF CUBEBS. *Syn.* Inj. Cubebæ. *Prep.* Cubebs, in powder, ℥j; extract of belladonna ʒj; boiling water f℥xvj; infuse in a covered vessel, and strain. In diseases of the mucous membranes. Irritant and narcotic.

INJECTION OF LEAD. *Syn.* Inj. Plumbi. *Prep.* Liquor of diacetate of lead ʒss; rose-water ℥j.

INJECTION OF LEAD AND OPIUM. *Syn.* Inj. Plumbi opiata. *Prep.* (Wendt.) Aqueous extract of opium 1½ gr.; mucilage ʒij; solution of diacetate of lead 4 drops; water ℥ij The above are cooling, sedative, and anodyne.

INJECTION OF MERCURY. *Syn.* Inj Hydrargyri. *Prep.* I. (P. C.) Quicksilver ʒj; gum ℥iss; rub till combined, then add water ℥iss.

II. (E. H.) Quicksilver and balsam of copaiba, of each ʒiv; yelk of 1 egg; rose-water ½ a pint As last.

INJECTION OF MORPHIA. *Syn.* Inj. Morphiæ. *Prep.* (Brera.) Morphia 2 grs.; oil of almonds ℥j; dissolve. Anodyne and emollient.

INJECTION OF MURIATIC ACID. *Syn.* Inj. Acidi muriatici. *Prep.* (P. C.) Muriatic acid 8 drops; water ℥iv.

INJECTION OF NITRATE OF SILVER. *Syn.* Inj. Argenti nitratis. *Prep.* I. (Collier.) Nitrate of silver 2 grs.; rose-water 1 oz.; dissolve.

II. (Jewell.) Nitrate of silver 12 grs.; distilled water f℥vj. For fistulous sores.

INJECTION OF OIL OF ALMONDS. *Syn.* Inj. Oleosa. *Prep.* (P. C.) Oil of almonds ʒiv; solution of diacetate of lead 8 drops; mix. Emollient and sedative.

INJECTION OF OPIUM. *Syn.* Inj. Opiata. *Prep.* I. (P. C.) Laudanum 40 drops; water ℥iv.

II. (Fr. H.) Wine of opium ʒj; barley water 1 pint. Anodyne.

INJECTION OF TANNIN. *Syn.* Inj. Tannini. Inj. Acidi Tannici. *Prep.* (Richard.) Tannin ℈j; water ℥viij; dissolve. Astringent.

INJECTION OF TEA. *Syn.* Inj. Theæ. *Prep* (P. C.) Green tea ʒj; boiling water ℥viij; infuse. Astringent; frequently used in fluor albus.

INJECTION OF TURPENTINE. *Syn.* Inj. Terebinthinæ. *Prep.* (St. B. H.) Olive oil f℥xij; oil of turpentine f℥iss. Vermifuge.

INJECTION OF WINE. *Syn.* Inj. Vini *Prep.* (Earle.) Red wine ℥xij; water ℥iv; mix Astringent; in hydrocele.

INJECTION OF WHITELEAD. *Syn.* Inj. Cerussæ comp. *Prep.* (P. C.) Compound

powder of carbonate of lead ℈j; sulphate of zinc 6 grs.; rose-water ℥iv.

INJECTION OF ACETATE OF ZINC. *Syn.* INJ. ZINCI ACETATIS. *Prep.* Sulphate of zinc ʒj; acetate of lead ℈iv; water 1 pint; mix, and filter.

INJECTION OF SULPHATE OF ZINC. *Syn.* INJ. ZINCI SULPHATIS. *Prep.* (P. C.) Sulphate of zinc 4 to 10 grs.; water f℥iv.

INK. *Syn.* WRITING FLUID. ATRAMENTUM, (*Lat.*) ENCRE, (*Fr.*) TINTE, (*Ger.*) Colored liquid employed for writing with a pen. Ink is made of various substances and colors, of which the following are the principal:—

INK, BLACK. *Prep.* I. Bruised Aleppo nutgalls 12 lbs.; water 6 galls.; boil in a copper vessel for 1 hour, adding water to make up for the portion lost by evaporation; strain and again boil the galls with water 4 gallons, for ½ an hour, strain off the liquor and boil a third time with water 2½ gallons, and strain; mix the several liquors, and while still hot add green copperas, coarsely powdered, 4 lbs.; gum arabic bruised small 3½ lbs.; agitate until dissolved, and after defecation, strain through a hair sieve, and keep it in a bunged-up cask for use. *Product.* 12 gallons, very fine and durable.

II. Campeachy logwood chips 3 lbs.; bruised galls 9 lbs.; boil in water as above, and to the mixed liquors add gum arabic and green copperas, of each 4 lbs.; to produce 16½ galls. of ink. *Quality.* Very good.

III. (Lewis.) Bruised galls, 3 lbs.; gum and sulphate of iron, of each 1 lb.; vinegar 1 gall.; water 2 galls.; macerate with frequent agitation for 14 days. To produce 3 galls. Fine quality.

IV. (M. Ribaucourt.) Bruised galls 1 lb.; logwood, in thin chips, and sulphate of iron, of each ½ lb.; gum 6 oz.; sulphate of copper and sugar candy, of each 1 oz. Boil the galls and logwood in 2½ galls. of water for 1 hour, or until reduced to one half, strain, add the other ingredients, and stir until dissolved, then decant and preserve in stone or glass bottles, well corked. Full colored.

V. (M. Desormeaux, jun.) Logwood chips 4 oz.; water 6 quarts; boil 1 hour and strain 5 quarts; add bruised galls 1 lb.; sulphate of iron calcined to whiteness 4 oz.; brown sugar 3 oz.; gum 6 oz.; acetate of copper ¼ oz.; agitate twice a day for a fortnight, then decant the clear, bottle and cork up for use.

VI. Bruised galls 2 lbs.; logwood, green copperas, and gum, of each 1 lb.; water 6 gallons; boil the whole of the ingredients in the water for 1½ hours, and strain 5 galls. Good, but not fine.

VII. Bruised galls 1 lb.; logwood 2 lbs.; common gum ¾ lb.; green copperas ½ lb.; water 5 gallons; boil. Common, but fit for ordinary purposes.

VII. (*Patent.*) Logwood shavings and powdered galls, of each 2 lbs.; green vitriol 1 lb.; gum ½ lb.; pomegranate bark ¼ lb.; water 1 gallon; infuse 14 days, with frequent agitation.

VIII. (*Asiatic.*) The same as the last. Both write pale, but turn very black by keeping, and flow well from the pen.

IX. (*Used in the Prerogative Office.*) Bruised galls 1 lb.; gum arabic 6 oz.; alum 2 oz.; green vitriol 7 oz.; kino 3 oz.; logwood raspings or sawdust 4 oz.; water 1 gallon; macerate as last. Said to write well on parchment.

X. (*Japan.*) This is a black and glossy kind of ink, which may be prepared from either of the above receipts by calcining the copperas until white or yellow, or by sprinkling it (in powder) with a little nitric acid before adding it to the decoction, (preferably the former,) by which the ink is rendered of a full black as soon as made. The glossiness is given by using more gum. Flows less easily from the pen, and is less durable than ink that writes paler and afterwards turns black.

XI. (*Exchequer.*) Bruised galls 40 lbs.; gum 10 lbs.; green sulphate of iron 9 lbs.; soft water 45 gallons; macerate for 3 weeks, employing frequent agitation. "This ink will endure for centuries."

Remarks. The ink prepared by the first formula is the most durable, and will bear dilution with *nearly* its own weight of water, and still be equal to the ordinary ink of the shops. I have writing by me that was executed with this kind of ink upwards of 50 years ago, which still possesses a good color. The respective qualities of the others are noticed at the foot of each.

According to the most accurate experiments on the preparation of black ink, it appears that the quantity of sulphate of iron should not exceed one-third part of that of the galls, by which an excess of coloring matter, which is necessary for the durability of the black, is preserved in the liquid. Gum, by shielding the writing from the action of the air, tends to preserve the color, but if much is employed, the ink flows languidly from *quill* pens, and scarcely at all from *steel* pens. The latter require a very limpid ink. The addition of sugar increases the flowing property of ink, but makes it dry more slowly, and frequently passes into vinegar, when it acts injuriously on the pen. Vinegar, for a like reason, is not calculated for the menstruum.

The addition of a few bruised cloves, or a little oil of cloves; or still better, a few drops of creosote, will effectually prevent any tendency to *mouldiness* in ink. The best *blue* galls should alone be employed in making ink.

Sumach, logwood, and oak bark, are frequently substituted for galls in the preparation of *common* ink. When such is the case, only about one-sixth or one-seventh of their weight of copperas should be employed.

The most permanent (tanno-gallate) inks are those which contain the proper quantity of oxide of iron, at the minimum of oxidizement, in a state of solution or minute suspension, by which means, not only does a larger quantity of the fluid flow from the pen on to a given space, but it also sinks into the substance of the paper, by which the stain is rendered more permanent and less easily removed by attrition. Such inks are uniformly pale until exposed to the air for some days, when they acquire their full color. When the iron is at the maximum of oxidizement, as is the case when calcined copperas is employed, the ink writes of a full black at first, but from its coloring matter being merely a suspended precipitate, it rests upon the surface of the paper without sinking into it, and may consequently be more easily erased than the former. Its black color is also more liable to fade

ple-spiked willow herb, sweetbrier, cherry tree, sloe, all of which are used for tea, either singly or mixed. In foreign countries a variety of plants are used instead of Chinese tea.

TEARS OF THE WIDOW OF MALABAR. *Prep.* Plain spirit at 18° B. 5 quarts; bruised cloves ½ oz.; bruised mace 48 grs.; digest in a corked carboy for a week, add burnt sugar to impart a slight color, filter, and add white sugar 4½ lbs.; dissolved in distilled or filtered rain water ½ gallon: some add 2 or 3 oz. of orange-flower water. A pleasant liquor.

TEETH, (THE.) An object very subservient to health, and which merits due attention, is the preservation of the teeth; the care of which, considering their importance in preparing the food for digestion, is, in general, far from being sufficiently cultivated. Very few persons, comparatively, wash their mouths in the morning, which ought always to be done. Indeed, this ought to be practised at the conclusion of every meal, where either animal food or vegetables are eaten; for the former is apt to leave behind it a rancid acrimony, and the latter an acidity, both of them hurtful to the teeth. Washing the mouth frequently with cold water is not only serviceable in keeping the teeth clean, but in strengthening the gums, the firm adhesion of which to the teeth, is of the greatest inportance in preserving them sound and secure. (See Cosmetics, Dentifrices.)

TELESCOPE. Some remarks connected with this subject will be found under the heads—Achromatism, Glass, Speculum, Metal, &c.

TELLURIUM, (From *tellus*, the earth.) A rare grayish-white metal, found only in small quantities in the metallic state, in the gold mines of Transylvania. It fuses below redness, and volatilizes at a red heat; sp. gr. 6·2578; with oxygen it forms 2 compounds.—Oxide of Tellurium (*tellurous acid*) is obtained by adding water to the nitric solution, or by evaporating it to dryness; a white powder.—Telluric Acid is obtained by deflagrating tellurous acid with nitre, and decomposing the resulting tellurate of potassa.—Telluretted Hydrogen (*hydrotelluric acid*) is a gaseous substance formed by acting with muriatic acid on an alloy of tellurium with zinc or tin. It bears some resemblance to sulphureted hydrogen.

TEMPERANCE DRINKS. (See Lemonade, Orangeade, Sherbet, Ginger Beer.)

TERRA COTTA. (*Baked clay.*) This term is applied to statues, architectural ornaments, &c., made of pure white clay, fine sand, and powdered potsherds, slowly dried, and baked to a strong hardness.

TEST FOR ARSENIC. Dr. Baumann recommends for detecting small quantities of arsenic, the suspected body to be triturated with from three to six times its amount of iron-filings, which have been exposed to a red heat, and are known to be free from arsenic, and heating the mixture on charcoal in the reducing flame of the blowpipe. Even with the smallest quantity of arsenic, the odor, at least, is disengaged. (Chem. Gaz.) See Arsenious Acid.

TESTING. The tests both of the purity and presence of the principal articles of commerce will be found in their alphabetical order.

THEINE. *Syn.* Theina. A peculiar crystallizable azotized substance, extracted from tea. (See Caffeine.)

THEBAINE. *Syn.* Paramorphia. A crystalline substance obtained by Thibourmery from an infusion of opium that had had its morphia extracted by acting on it by an excess of lime. The residue dissolved in dilute acid, precipitated by ammonia, and the precipitate dissolved in alcohol or ether, yields pure thebaine on evaporation. It has a sharp metallic taste, is fusible, alkaline, and scarcely soluble in water; with the weak acids it forms salts which do not crystallize. It is distinguished from morphia by not becoming blue on the addition of sesquichloride of iron. 1 gr. injected into the jugular vein of a dog, acts like strychnia, and causes tetanus and death in a few minutes. (Majendie.)

THEOBROMINE. A peculiar principle, obtained by Woskresensky from the nut of the theobroma cacao. It is obtained by digesting the nuts in distilled water, straining the decoction, and mixing it with acetate of lead; after filtration, the oxide of lead being removed with sulphureted hydrogen, the clear liquor is evaporated. A reddish-white powder.

THERMOMETERS. Fahrenheit's thermometer is the one universally employed in England, while Celsius', or the centigrade scale, is used on the Continent. Reaumur's is another scale occasionally employed. As reference to these scales are frequently met with in books, it is useful to know their relative value, and the method of reducing the one to the other. The *boiling-point of water* is indicated by 212° on Fahrenheit's scale, 100° on the centigrade scale, and 80° on that of Reaumur; the *freezing-point of water* marks 32° Fahrenheit, and 0, or zero, on the centigrade or Reaumur. The 0 or zero of Fahrenheit is 32° below the freezing-point of water.

1. To reduce Centigrade degrees to those of Fahrenheit, multiply by 9, and divide by 5, and to the quotient add 32, that is,—

$$\frac{\text{Cent.} \times 9}{5} + 32 = \text{Fahr.}$$

2. To reduce Fahrenheit's degrees to Centigrade:—

$$\frac{\text{Fahr.} - 32 \times 5}{9} = \text{Cent.}$$

3. To reduce Reaumur's to Fahrenheit's:—

$$\frac{\text{Reau.} \times 9}{4} + 32 = \text{Fahr.}$$

4. To convert Fahrenheit's to Reaumur's:—

$$\frac{\text{Fahr.} - 32 \times 4}{9} = \text{Reaumur.}$$

THIONURIC ACID. A white crystalline acid, obtained by the action of sulphurous acid on alloxan. Its saturated solution, heated to the boiling-point, congeals into a semifluid, crystalline mass of uramile.

THORINA. *Syn.* Oxide of Thorium. A primitive earth discovered by Berzelius in 1828. It is obtained from the mineral called *thorite*, by reducing it to powder, digesting in muriatic acid, evaporating to dryness, redissolving in dilute acid, filtering, passing sulphureted hydrogen through the solution, precipitating by pure ammonia, wash-

tions of dyeing and bleaching, and at once offer a cheap and excellent material for marking linen, &c., as they cannot be dissolved off by any menstrua that will not destroy the fabric. They must be employed with stamps or types, which is a neater method than that with a brush or pen.

V. (M. Bezanger.) This patent ink consists of lampblack and caustic soda, mixed with gelatin and caustic soda. It is said to be indelible, and to resemble China ink. (Moniteur Industriel.)

VI. Indian ink, ground up with ordinary black writing ink, forms a cheap indelible ink for common purposes. It will resist the action of chlorine, most acids, and even ablution with a brush or sponge.

INK, INDIAN. *Syn.* China Ink. Indicum. Atramentum Indicum. *Prep.* I. (Proust.) Purify real lampblack by washing it with potash lye, dry, make it into a thick paste with a solution of glue, mould and dry.

II. (M. Merimée.) Dissolve glue in water, add a strong solution of nutgalls, and wash the precipitate in hot water; then dissolve it in a spare solution of glue, filter, evaporate to a proper thickness, and form it into a paste as before, with purified lampblack.

III. (Cooley.) Boil a weak solution of glue at a high temperature in a Papin's digester for 2 hours, then boil it in an *open* vessel for 1 hour more, filter and evaporate to a proper consistence, then make a paste as before with purified lampblack, adding a few drops of essence of musk and about half as much essence of ambergris to perfume; lastly, mould into cakes, and when dry, ornament them with Chinese characters and devices. Quality very superior; does not gelatinize in cold weather like ordinary imitations.

IV. (Gray.) Pure lampblack made up with asses' skin glue, and scented with musk.

V. Seed lac ½ oz.; borax 1 dr.; water ½ pint; boil to 8 oz., filter, and make a paste with pure lampblack as before. Good; when dry it resists the action of water.

Remarks. The Chinese do not use glue in the preparation of their ink, but a glutinous vegetable juice or solution, which at once imparts brilliancy and durability. Starch converted into gum by means of sulphuric acid, or British gum, has been recommended as a substitute, (M. Merimée.) But from information afforded me by a gentleman who has resided some years in China, I am led to believe that the liquid employed by the Chinese to convert their black pigment into a paste, is either an infusion or decoction of some seeds abounding in mucilage, and not the juice of a plant as usually supposed. Indian ink is chiefly employed by artists, but it has been occasionally given as a medicine, dissolved in water or wine, in hemorrhages and stomach complaints. *Dose.* 1 to 2 dr.

INK, MARKING. Ink bottoms. Used by packers for marking bales, boxes, &c.

INK, PERPETUAL. *Prep.* Pitch 3 lbs.; melt over the fire, then add lampblack 1 lb.; mix well. *Used* in a melted state to fill the letters on tombstones, marbles, &c. Without actual violence it will endure as long as the stone itself.

INK, RED. *Prep.* I. Ground Brazil wood 8 oz.; vinegar 10 pints; macerate for 4 or 5 days; boil in a tinned-copper vessel to one half, then add of each alum 8 oz., and gum 3 oz.; dissolve.

II. As the last, but use water or beer instead of vinegar.

III. Stale beer 1 pint; cochineal, bruised, 1 dr.; gum arabic 1 oz.; ground Brazil and alum, of each 2 oz.; boil or macerate with agitation for 14 days, and strain.

IV. Pure carmine 12 grs.; water of ammonia 3 oz.; dissolve, then add powdered gum 18 grs. Half a drachm of powdered drop lake may be substituted for the carmine where expense is an object. Color *superb*. (Buchner's Repert.)

V. Cochineal, in powder, 1 oz.; hot water ½ pint; digest, and when *quite cold*, add spirit of hartshorn ½ pint, or liquor of ammonia 1 oz.; dilute with 3 or 4 oz. of water; macerate for a few days longer, then decant the clear. *Color*, very fine.

INK, SILVER. This is prepared like gold ink.

INKS, SYMPATHETIC. Fluids which, when employed for writing on paper, do not render the marks visible till acted on by some reagent. Sympathetic inks are commonly employed as the instruments of secret correspondence, and frequently escape detection, but by heating the paper before the fire until it is nearly scorched, the whole of them may be rendered visible.

The following are the most common and amusing sympathetic inks:—1. Sulphate of copper and sal ammoniac, equal parts, dissolved in water; writes colorless but turns yellow when heated.—2. Onion juice, like the last.—3. A weak infusion of galls; turns black when moistened with weak copperas water.—4. A weak solution of sulphate of iron; turns blue when moistened with a weak solution of prussiate of potash, and black with infusion of galls.—5. The diluted solutions of nitrate of silver and terchloride of gold; darkens when exposed to the sunlight.—6. Aquafortis, spirits of salts, oil of vitriol, common salt or saltpetre dissolved in a large quantity of water; turns yellow or brown when heated.—7. Solution of nitromuriate of cobalt; turns green when heated, and disappears again on cooling.—8. Solution of acetate of cobalt, to which a little nitre has been added; becomes rose-colored when heated, and disappears on cooling.

INK, YELLOW. *Prep.* I. Boil French berries ½ lb., and alum 1 oz., in water 1 quart, for half an hour or longer, then strain and dissolve in the hot liquor, gum arabic 1 oz.

II. Gamboge in coarse powder 1 oz.; hot water 5 oz.; dissolve, and when cold, add spirit ½ oz. or 1 oz.

INK, TO RESTORE FADED. Writing rendered illegible by age may be restored by moistening it by means of a feather with an infusion of galls, or a solution of prussiate of potash slightly acidulated with muriatic acid, observing so to apply the liquid as to prevent the ink spreading.

INK STAINS may be readily removed from white articles by means of a little salt of lemons, diluted muriatic acid, oxalic acid, or tartaric acid, and hot water; or by means of a little solution of chlorine or chloride of lime. The spots should be afterwards *thoroughly* rinsed in warm water, before touching them with soap. *Marking ink* may be removed by ammonia water, solution of chloride of lime, liquid chlorine, or iodine.

INOCULATION. (In Surgery.) The inser-

tion of poisonous or infectious matter into any part of the body for the purpose of propagating a mild form of disease, and thus preventing or lessening the virulence of future attacks. The word is generally applied to the insertion of the virus of the common smallpox, by which a milder form of the disease is produced, than when it is caught in the natural way. Vaccination has now very generally superseded inoculation.

Oper. Inoculation is performed by inserting the point of a lancet wetted with smallpox matter under the cuticle, and afterwards gently rubbing the moistened point over the scratch.

INULIN. *Syn.* ALANTIN. MENYANTHIN. ELECAMPIN. DAHLIN. DATISCIN. A peculiar starch-like substance first obtained by Rose from the inula helenium or elecampane. It may be obtained by boiling elecampane in 4 times its weight of water, and allowing the decoction to repose for a short time. It is distinguished from starch by the precipitate formed in the cold decoction by an infusion of gall nuts, not disappearing until the liquid is heated to above 212°, while the precipitate from starch redissolves at 122° F. Inulin is soluble in boiling water, but separates as the liquid cools.

IODATE. *Syn.* IODAS, (*Lat.*) A compound formed of iodic acid and a base in definite proportion. The iodates resemble the chlorates of the corresponding bases. They may be easily recognised by the development of free iodine when treated with sulphurous, phosphorous, and hydrochloric acids, and other deoxydizing agents, and by their solutions being converted into iodides when treated with sulphureted hydrogen. They are all of sparing solubility, and many are quite insoluble in water. All the insoluble iodates may be obtained from the iodate of potassa, by decomposing it in solution by a solution of a soluble salt of the base.

IODATE OF MERCURY. *Syn.* HYDRARGYRI IODAS. *Prep.* Precipitate a solution of mercury in nitric acid with another of iodate of potassa. A yellow powder resembling Turpeth's mineral.

IODATE OF POTASSA. *Syn.* POTASSÆ IODAS. *Prep.* I. Neutralize a hot solution of potassa with iodine, evaporate to dryness by a gentle heat, powder, and digest in alcohol, to dissolve out the iodide of potassium, then dissolve the residue in hot water and crystallize.

II. (M. Henry, jun.) Iodide of potassium 2 parts; chlorate of potassa 3 do.; fuse the iodide of potassium in a large Hessian crucible; remove it from the fire, and add, while still fluid, successive portions of the powdered chlorate of potassa, stirring well after each addition. When the matter ceases to froth up, cool, powder, and digest in tepid water to dissolve out the chloride of potassium, when the residue may be dissolved in hot water and crystallized.

Remarks. Iodate of potassa has been recommended in bronchocele. A biniodate and teriodate of potassa may also be formed, but possess little interest.

IODATE OF SILVER. *Syn.* ARGENTI IODAS. *Prep.* From a solution of nitrate of silver, as Iodate of Mercury. A white powder, soluble in ammonia.

IODIC ACID. *Syn.* OXIODINE. ACIDUM IODICUM. An acid compound of iodine and oxygen discovered by Gay Lussac and Davy.

Prep. I. Dissolve iodate of soda in sulphuric acid in considerable excess, boil for 15 minutes, and set the solution aside to crystallize. *Pure.*

II. (M. Boursen.) Iodine 1 part; *strongest* (monohydrated) nitric acid 4 parts; mix, and apply a gentle heat until the color of the iodine disappears, then evaporate to dryness and leave the residuum in the open air at a temperature of about 15° C. When by attracting moisture it has acquired the consistence of a sirup, put it into a place where the temperature is higher and the air drier, when in a few days very fine white crystals of rhomboidal shape will form. (Compt Rend. xxiv.) *Pure.*

III. (J. L. Lassaigne.) Treat a solution of nitrate of silver with an excess of iodine, filter, evaporate to dryness, and proceed as last. *Pure.*

IV. Diffuse iodine in powder through distilled water, then pass a current of chlorine through the liquid; evaporate.

Remarks. Iodic acid is decomposed into oxygen and iodine by a heat of about 450 to 500° F. It is very soluble in water and deliquescent; it detonates with inflammable bodies like the nitrates and chlorates; with the bases it forms salts called IODATES. The IODATE OF SODA above alluded to may be made in the same way as the iodate of potassa. Iodic acid is used as a test for morphia and sulphurous acid. (See IODATE.)

IODIDE. *Syn.* IODURE. IODURET. HYDRIODATE. IODIDUM; IODURETUM; HYDRIODAS, (*Lat.*) A compound of iodine and a base.

IODIDE OF ARSENIC. *Syn.* ARSENICI IODIDUM. *Prep.* (Wackenroder.) Sublimed metallic arsenic 1 gr.; pure iodine 6 grs.; water 2 drachms; digest together, evaporate by a gentle heat, and as soon as the mass begins to solidify, the temperature must not exceed 86° F. A red crystalline mass is obtained. (See p. 74.)

IODIDE OF ARSENIC, SOLUTION OF. *Prep.* (Wackenroder.) Dissolve the product of the above process in water 6 oz.; every drachm of which will contain one-forty-eighth gr. of metallic arsenic, and one-tenth gr. (nearly) of iodine.

IODIDE OF CYANOGEN. *Prep.* (Mitscherlich.) Gently heat a mixture of bicyanide of mercury, iodine, and water, in a retort, when iodide of cyanogen will sublime and collect in the neck of the retort, under the form of a crystalline snow or needles. It volatilizes at 100° F., and is soluble in water, ether, and alcohol.

IODIDE OF NITROGEN. *Syn.* TERIODIDE OF NITROGEN. A dark powder, which subsides when iodine is put into liquor of ammonia. It may be more safely and conveniently made by saturating alcohol of sp. gr. ·852 with iodine, adding a large quantity of ammonia, and agitating the mixture; water must now be added, when the iodide will be precipitated, and must be carefully washed with cold distilled water. *** It detonates violently as soon as it becomes dry, and by slight pressure, or friction, even when moist. It should only be prepared in very *small quantities* at a time.

IODIDES OF PHOSPHORUS. *Prep.* I (*Protiodide.*) Phosphorus 1 part; iodine 7 parts; mix in a close vessel, placed in a freezing mixture

Orange colored; melts at 212°; volatile, and decomposed by water.

II. (*Sesquiodide.*) Phosphorus 1 part; iodine 12 parts; as last. A dark gray semi-crystalline mass, liquid at 84° F.

III. (*Periodide.*) Phosphorus 1 part; iodine 20 parts; as last. A black mass, fusible at about 115° F. All the above yield hydriodic acid and phosphorous or phosphoric acid, by contact with water.

IODIDE OF SULPHUR. *Syn.* SULPHURIS IODIDUM. *Prep.* Iodine 4 parts; sulphur 1 part; place the mixture in a loose-corked flask, immerse it in a water bath, and, as soon as it melts, stir it with a glass rod, then place in the cork, remove the bath from the fire, and let the two cool together. When cold, break the iodide into pieces, and place it in a wide-mouthed stoppered bottle. In this way a beautiful semi-crystalline, dark gray mass, resembling antimony, is obtained.

Remarks. An ointment made with 5 parts of iodide of sulphur, and 96 of lard, or 8 of the iodide and 144 of lard, has been recommended by Biett in tuberculous affections of the skin. Iodide of sulphur stains the skin like iodine, and is readily decomposed by contact with organic substances.

IODIDE OF STARCH. *Syn.* AMYLI IODIDUM. *Prep.* (Dr. Buchanan.) Iodine 24 grs.; water q. s.; triturate; then add starch ℥j; again triturate, until the mass assumes a uniform color. One of the most worthless of the preparations of iodine.

IODIDES, DOUBLE. Several of these compounds have been described by Bonsdorff, Boullay, and Liebig, many of which are formed by dissolving the iodides in a solution of iodide of potassium, when crystals of the double salt are deposited as the liquid cools, or on evaporation. They possess but little interest in a practical point of view.

IODINE: *Syn.* IODE, (*Fr.*) IOD, (*Ger.*) IODIUM; IODINIUM; IODINA, (*Lat.*, from ιωδης, *violet colored*, on account of the color of its vapor.) A chemical element, accidentally discovered in 1812, by De Courtois, a saltpetre manufacturer at Paris, but was first described by Clement, in 1813, and its precise nature was soon afterwards determined by Sir H. Davy and M. Gay Lussac. It is found both in the animal, vegetable, and mineral kingdoms, but exists in greatest abundance in the vegetable family algæ. It is principally manufactured in the neighborhood of Glasgow, from the mother waters of kelp.

Prep. I. Extract all the soluble part of kelp by water, and crystallize the soda by evaporation; to the mother lye add oil of vitriol in excess and boil the liquid, then strain it to separate some sulphur, and mix the filtered liquor with as much manganese as there was oil of vitriol used: on applying heat, the iodine sublimes in the form of grayish black scales, with a metallic lustre. The boiling is conducted in a leaden vessel; and a cylindrical leaden still, with a *very short* head, and connected with 2 or 3 large globular glass receivers, is used for the subliming apparatus. Care must be taken to watch the process, and prevent the neck of the still becoming choked with condensed iodine.

II. (Ure.) Saturate the residual liquor of the manufacture of soap from kelp, of the sp. gr. of 1·374, heated to 230° F., with sulphuric acid diluted with half its weight of water, cool, decant the clear, strain, and to every 12 fluid ounces add 1000 grs. of black oxide of manganese, in powder; put the mixture into a glass globe, or matrass with a wide neck, over which invert another glass globe, and apply heat with a charcoal chauffer; iodine will sublime very copiously, and condense in the upper vessel, which as soon as warm should be replaced by another; and the two globes thus applied in succession, as long as violet vapor arises. It may be washed out of the globes with a little cold water. A thin disc of wood, having a hole in its centre, should be placed over the shoulder of the matrass, to prevent the heat from acting on the globular receiver. On the large scale, a leaden still, as before described, may be employed, and receivers of stoneware economically substituted for glass ones. The addition of the sulphuric acid should be made in a wooden or stoneware basin or trough. *Prod.* 12 oz. yield 80 to 100 grs.

III. (Soubeiran.) Add a mixed solution of 1 part of sulphate of copper and 2¼ parts of protosulphate of iron to the mother liquors of the soda works, as long as a white precipitate is thrown down; the precipitate (diniodide of copper) must be then collected, dried, mixed with its own weight of finely-powdered black oxide of manganese, and distilled by a strong heat in a retort; dry iodine will pass over. By the addition of sulphuric acid with the manganese, a less heat is required.

Remarks. The top of the leaden still employed for the preparation of iodine, is usually furnished with a moveable stopper, by which the process may be watched, and additions of manganese or sulphuric acid made, if required. To render it pure, it should be dried as much as possible, and then resublimed in glass or stoneware.

Prop. Iodine is usually met with under the form of semicrystalline lumps, having a metallic lustre, or in micaceous, friable scales, somewhat resembling gunpowder. It has a grayish-black color, a hot acrid taste, and a disagreeable odor, not much unlike that of chlorine. It fuses at 225° F., volatilizes slowly at ordinary temperatures, boils at 347°, and when mixed with water rapidly rises along with its vapor at 212°. It dissolves in 7000 parts of water, and freely in alcohol and ether. It may be crystallized in large rhomboidal plates, by exposing to the air a solution of it in hydiodic acid. Iodine, like chlorine, has an extensive range of affinity; with the salifiable bases, it forms compounds termed *Iodides*, *Iodurets*, or *Hydriodates*; and it destroys vegetable colors. Many of the iodides are used in medicine.

Pur. The iodine of commerce is usually that of the first sublimation, and commonly contains 12 to 20% of water. Some of the foreign iodine, obtained by precipitation with chlorine, without subsequent sublimation, frequently contains ¼th water, has a leaden-gray color, and a sensible odor of chlorine. Coal, plumbago, oxide of manganese, crude antimony, and charcoal, are also frequently mixed with it. *Water* may be detected by the loss of weight it suffers when exposed to strong pressure between the folds of bibulous paper,—*chlorine*, by the odor, and the other substances

mentioned above, by digestion in spirits of wine, when the iodine will dissolve, leaving the impurities behind. Before use as a medicine, "it must be dried, by being placed in a shallow basin of earthenware, in a small confined space of air, with 10 or 12 times its weight of fresh-burnt lime, till it scarcely adheres to the side of a dry bottle." Pure iodine "is entirely vaporizable; 39 grs., with 9 grs. of quicklime, and ℥iij of water, when heated short of ebullition, slowly form a perfect solution, which is *yellowish* or *brownish*, if the iodine be *pure*, but colorless, if it contains more than 2℥ of water, or other impurity." (P. E)

Uses, Dose, &c. Iodine is chiefly used as a medicine, and a chemical test. Its physiological action, when applied externally, is that of an irritant, and, when swallowed in large doses, it produces powerful gastric irritation. In small doses, it appears to be both alterative and tonic, rapidly diffusing itself through the body, and exerting a stimulating action on the organs of secretion. It is also said to be diuretic, and in some cases to have produced diaphoresis and salivation. It exerts a powerful anti-aphrodisiac action, and instances are recorded where absorption of the mammæ and testæ have followed its exhibition. (Hufeland's Journal.) *Dose.* ½ gr. dissolved in spirit, or in water, by means of an equal weight of iodide of potassium. It is seldom exhibited alone, being usually combined with the latter substance, and in fact this salt is now generally preferred by practitioners. Iodine, in medicinal doses, has been exhibited in the following diseases, as well as in most others depending on an imperfect action of the absorbents, or accompanied by induration or enlargement of individual glands or organs:—Internally, in *bronchocele, goitre, Derbyshire neck, scrofula, ovarian tumors, enlargement or induration of the lymphatic, prostate, and parotid glands, amenorrhœa, leucorrhœa, diseases of the muco-genital tissues, phthisis, chronic nervous diseases, lepra, psoriasis, chronic rheumatism, dropsies, hydrocele, &c.*:—Externally, in *scrofula, numerous skin diseases, (especially the scaly,) erysipelas, diseased joints, chilblains, burns, scalds, various wounds, to check ulceration, to promote absorption, &c.* It is applied externally in the form of ointment, solution, or tincture.

Tests. Free iodine may be recognised by—1. The violet color of its vapor.—2. Striking a blue color with starch: this test is so delicate that water containing only $\frac{1}{450000}$ part of iodine, acquires a perceptible blue tinge on the addition of starch. (Stromeyer.)—3. Nitrate of silver causes a white precipitate in solutions containing iodine.—4. Chloride of palladium causes a black, flaky precipitate; equal in sensibility to starch. (M. Bauman.)—5. It strikes a blue color with opium and narceine.

Iodine in combination, as it exists in iodic acid and the *iodates*, does not strike a blue color with starch, without the addition of some deoxydizing agent, as sulphurous acid or morphia; and as it exists in the *iodides*, not until the base is saturated with an acid, (as the sulphuric or nitric,) when iodine being set free, immediately reacts upon the starch. An excess of either acid or alkali destroys the action of the test. By mixing the liquid containing the iodine with the starch and sulphuric acid, and lightly pouring thereon a small quantity of aqueous chlorine, a very visible blue zone will be developed at the line of contact. (Balard.)

Solutions containing iodates yield, with nitrate of silver, a white precipitate soluble in ammonia; the *iodides*, under the same circumstances, give a pale yellowish precipitate with nitrate of silver, scarcely soluble in ammonia; a *bright yellow* one with acetate of lead; and a *scarlet* one with bichloride of mercury. The *iodates* deflagrate when thrown on burning coals, but the *iodides* do not. The *iodates* may also be tested as iodides, by first heating them to redness, by which they lose their oxygen, and are converted into iodides.

IODINE, CHLORIDES OF. When dry chlorine is passed over dry iodine, at common temperatures, heat is evolved, and a solid chloride results. It is orange-yellow when the iodine is fully saturated, and reddish orange when the iodine is in excess. It deliquesces in the air, is volatile, and very soluble in water, forming a colorless solution, which exhibits acid properties. It is the *chloriodic acid* of Sir H. Davy. The *protochloride of iodine* is formed when chlorine is passed into water holding iodine in suspension, and the *perchloride* by repeatedly distilling the protochloride, or by adding to a solution of the latter a strong solution of corrosive sublimate. The latter is also called the *terchloride*.

IODOSALICULIC ACID. A dark brown fusible mass, obtained by distilling a mixture of iodide of potassium and chloro-saliculic acid; or by dissolving iodine in saliculic acid.

IODO-SULPHURIC ACID. *Prep.* Drop sulphuric acid into a hot concentrated aqueous solution of iodic acid, as long as a precipitate falls. When strongly heated, it sublimes, and is decomposed, but by means of a gentle heat, gradually applied, it melts, and crystallizes in yellow rhomboids as it cools. In a similar manner may be formed *iodo-phosphoric* and *iodonitric acids*. All these act with great energy on the metals, and dissolve gold and platinum.

IODOUS ACID. *Prep.* (Sementini.) Chlorate of potassa and iodine, equal parts; triturate together, until reduced to a homogeneous yellow mass; then heat the mixture over a spirit-lamp, in a glass retort connected with a spacious receiver, until vapors cease to arise. The oily liquid in the receiver is the iodous acid.

II. (Pleischl.) Chlorate of potash 3 parts; iodine 1 part; as last.

Remarks. Iodous acid, or oxide of iodine, reddens test papers, is volatile at 112° F., and freely dissolves iodine. Little is known respecting its precise composition. (See Iodic Acid.)

IODURETED IODIDE OF POTASSIUM. Iodine dissolved in a solution of iodide of potassium. Various strengths are employed by different authorities. (See Solutions.)

IRIDIUM. (From Iris, *the rainbow*, because of the variety of colors exhibited by its solutions.) A rare metal, discovered by Descotils in 1803, and by Tennant in 1804, in the black powder left in dissolving platina. It is obtained in combination with osmium.

Prep. (Wollaston.) Reduce the pulverulent residue of the ores of platina to fine powder, along with ⅓ of its weight of nitre, and heat the mixture

to redness in a silver crucible, until reduced to a pasty state, and the odor of oxide of osmium becomes perceptible; cool, powder, agitate with the smallest possible quantity of water, place the solution in a retort, acidulate with oil of vitriol diluted with an equal weight of water, and distil rapidly into a clean receiver, as long as fumes of *osmic acid* pass over and condense as a white crust on the sides of the vessel, afterwards liquefying, and sinking beneath the water, forming a flattened globule. By solution in water, agitation with mercury, and the addition of muriatic acid, *osmium* is obtained as a black porous powder, which exhibits a metallic lustre when rubbed. The undissolved portion must now be digested in muriatic acid, and the solution treated with any metal but gold or platinum, when the *iridium* will be precipitated.

Prop., &c. Brittle, pulverulent, and when polished, resembling platinum. It is the heaviest, hardest, most infusible, indestructive, and least affected by acids, of all the metals. With chlorine, iridium forms four compounds:—the *protochloride*, formed by transmitting chlorine over powdered iridium, heated to a dull red, or by digesting the hydrated protoxide in muriatic acid;—the *sesquichloride*, by calcining iridium with nitre, digesting in nitric acid, washing with water, and solution in hydrochloric acid;—the *bichloride*, by digesting the sesquichloride in hot nitro-muriatic acid;—the *terchloride*, obtained as a double chloride of potassium. With oxygen, iridium forms a *protoxide*, *sesquioxide*, and *teroxide*, each of which may be obtained by precipitating a solution of the corresponding chloride with an alkali.

IRIDIO-CHLORIDES. Double salts, formed of the chlorides of iridium with other chlorides. Some of them are crystallizable and soluble.

IRON. *Syn.* FERRUM, (*Lat.*) FER, (*Fr.*) EISEN, (*Ger.*) FERRO, (*It.*) FERRO, (*Port.*) HIERRO, (*Sp.*) JERN, (*Dan. & Swed.*) IJZEN, (*Dut.*) MARS, (*Alch.*) The early history of iron is lost in its antiquity. It is said to have been employed as a medicine upwards of 3200 years ago. As a remedial agent, when properly exhibited, it acts as a genial stimulant and tonic, and generally proves beneficial in cases of chronic debility, unaccompanied with organic congestion or inflammation. For this purpose, the protoxide or its salts should alone be employed, as the peroxide and its salts act, almost universally, as irritant stimulants, occasioning heartburn, febrile symptoms, and accelerated pulse. The powers of the protocarbonate, as it exists in mineral waters, held in solution by carbonic acid in excess, appears to be the form most congenial to the human body; and from its state of dilution, "is rapidly absorbed by the lacteals, and speedily imparts a ruddy hue to the wan countenance." Iron is undoubtedly one of the most valuable articles of the materia medica, and appears, from the antiquity of its introduction into medicine, and the number of its preparations, to have been deservedly appreciated. It bears the recommendation of upwards of 3000 years upon its brow, and surely a medicine that hath withstood such vicissitudes, *cannot* be *destitute* of *virtue*.

Prep. Iron is only prepared on the large scale. In Sweden it is extracted from magnetic iron, and micaceous iron ore; and in England, principally from clay iron ore. It is obtained by smelting the ore along with coke and a flux, (either limestone or clay.) The crude iron thus obtained is run into moulds, and then constitutes CAST IRON OF PIG IRON, (*ferrum fusum.*) By the subsequent process of refining, (puddling, welding,) it is converted into SOFT IRON OF WROUGHT IRON, (*ferrum cusum.*)

Prop. & Uses. The properties and uses of iron are too well known to require description. Its applications in almost every branch of human industry, are almost infinite. It is remarkably ductile, and possesses great tenacity, but it is less malleable than many of the other metals. Its sp. gr. is 7·788. It is the hardest of all of the malleable and ductile metals, and when combined with carbon or silica, (steel,) admits of being tempered to almost any degree of hardness or elasticity. IRON-FILINGS, (*ferri limaturæ,*) IRON-TURNINGS, (*ferri ramenta, ferri scobs,*) and IRON-WIRE, (*ferri filum,*) are the forms under which iron is ordered in the pharmacopœias. The last is only used in preparations, but the others are also taken. *Dose.* Of the filings 5 to 10 grs., in chlorosis, &c. For medical purposes, iron-filings and turnings should be purified by washing, drying, and separating them from particles of copper and other metals, by laying a sieve over them, and drawing them through it with a magnet.

Tests. 1. Metallic iron is attracted by the magnet. 2. It dissolves in muriatic and sulphuric acids, with the evolution of hydrogen gas. 3. Its oxides are also soluble in the acids. 4. The solutions of iron (ferruginous salts) yield a greenish white precipitate, subsequently turning red or brown, when treated with alkalis. 5. Aurochloride of sodium gives a purple precipitate with solutions of the protosalts of iron, and red prussiate of potash a blue one. 6. Prussiate of potash, under like circumstances, gives a pale blue one, or a full blue, if a little nitric acid has been previously added. The protosalts may thus be all converted into persalts, and tested accordingly. 7. The persalts of iron yield a blue precipitate with *yellow* prussiate of potash, but are unaffected by the red prussiate; sulphocyanic and meconic acids strike a red color; gallic acid, tannic acid, and infusion or tincture of galls, a bluish black; succinate and benzoate of ammonia, a yellowish one; citric acid or a citrate, a pale red color, (transparent.) 8. Cochineal freed from fat by ether, and then digested in water, (or very weak spirit,) gives a solution which is colored violet by the protosalts of iron. (Kastner.) 9. Hydrosulphuret of ammonia gives a black precipitate. 10. Phosphate of soda precipitates the persalts white, and the protosalts blue.

IRON, ACETATE OF. ACETATE DE FER, (*Fr.*) ACETATO DI FERRO, (*Ital.*) FERRI ACETAS, (*Lat.*) *Prep.* I. (P. D.) Sesquioxide of iron 1 part; acetic acid 6 parts; digest 3 days and filter. Tonic. *Dose.* 10 to 25 drops in water or wine. This preparation is a mixture of the proto- and per-acetate of iron.

II. (*Pyrolignite of iron. Iron liquor. Dyer's acetate of iron.*) *Prep. a.* (Prof. Runge.) Eight suitable vessels are arranged one above another, like a staircase, so that the top of the upper one may rest over the one immediately below it, and so on of the others to the bottom one. The eight

vessels are now filled with old scraps of iron, and the upper one with pyroligneous acid; after half an hour this is drawn off into the vessel next below it, and this again, after the lapse of another half hour, into the *third*, and so on until the last is emptied. The acid is now passed a second time through the vessels in the same way as before, and thus becomes more strongly impregnated with iron in a less time than by *any other* means, except the following:—

b. (Dr. Winterfield.) This consists in employing several wooden cylinders, resembling those used in the quick process of making vinegar; the space between the two perforated bottoms, usually filled with wood shavings, being occupied with scraps of iron. Pyroligneous acid is then passed through them, and the same system of ventilation observed as in the manufacture of vinegar. (Gewerbe-Blatt f. Sachsen.)

c. Leave old scraps of iron in a cask of vinegar, or pyroligneous acid, and employ occasional agitation, until a sufficiently strong solution is obtained. When the deposite of tar on the iron hinders the solution, it may be burnt off.

d. Add a solution of acetate of lime to another of green copperas, as long as a precipitate is formed; decant.

III. (*Protacetate.*) Dissolve freshly precipitated protoxide or carbonate of iron in acetic acid, or add a solution of acetate of lime to another of protosulphate of iron, and evaporate out of contact with the air. Small green prismatic crystals.

IV. (*Sesquiacetate. Peracetate.*) Dissolve hydrated peroxide of iron in acetic acid, or precipitate a solution of acetate of baryta by another of persulphate of iron. Uncrystallizable.

Remarks. All the above, prepared with crude materials, are used as mordants by the dyers.

IRON, ARSENITE OF. *Prep.* I. (*Protarsenite. Ferri arsenias.*) Precipitate a solution of protosulphate of iron with another of arsenite of soda or ammonia; wash and dry. A yellowish brown powder, used in medicine as a tonic, alterative, and febrifuge.

II. (*Perarsenite. Sesquiarsenite.*) Prepared by precipitating peracetate of iron with arsenite of ammonia, or by boiling nitric acid on the protarsenite.

Remarks. The *arseniates* of the iron may be formed in a similar way, from the arseniate of soda or ammonia.

IRON, ALBUMINATE. *Prep.* I. (Lassaigne.) Precipitate a filtered solution of white of egg with another of persulphate of iron, wash the deposite in water, and dissolve it in alcohol, holding caustic potassa in solution.

II. (Cooley.) Dissolve well washed hydrated protoxide or peroxide of iron in white of egg, diluted with twice its weight of water, and filtered.

Remarks. As a therapeutic agent, the albuminate of iron is highly spoken of by M. Lassaigne and other high authorities, who recommend it as a preparation especially adapted by its nature, on theoretical grounds, for combining with the tissues of the body. It will no doubt, ere long, take a prominent situation among the most esteemed of our chalybeates.

IRON, AMMONIO-CHLORIDE OF. *Syn.* FERRO-CHLORIDE OF AMMONIA. AMMONIATED IRON. ENS VENERIS BOYLEI. ENS MARTIS, (P. L. 1720.) FLORES MARTIALES, (P. L. 1775.) FERRUM AMMONIACALE, (P. L. 1788.) FERRUM AMMONIATUM, (P. L. 1809 and 1824.) FERRI AMMONIO-CHLORIDUM, (P. L. 1836.) FLORES SALIS AMMONIACI MARTIALIS. MURIAS FERRI ET AMMONIÆ. *Prep.* I. (P. L.) Sesquioxide of iron ℥iij; muriatic acid ½ pint; digest in a proper vessel in a sand-bath for 2 hours, then add sal ammonia lb. iiss, dissolved in water 3 pints; filter, evaporate to dryness, and reduce the mass to coarse powder. Orange-colored crystalline grains.

II. Rub sal ammoniac with twice its weight of colcother or rust of iron, sublime with a quick sudden heat, and repeat the sublimation with fresh sal ammoniac as long as the flowers are well colored. Difficult to manage.

Remarks. Ammonio-chloride of iron "is totally soluble in proof spirit and in water. Potassa added to the solution throws down sesquioxide of iron, and when added in excess, evolves ammonia." (P. L.) Tonic. Emmenagogue and aperient. *Dose.* 5 to 15 grs. in glandular swellings, obstructions, &c.

IRON, AMMONIO-TARTRATE OF. *Syn.* AIKIN'S AMMONIO-TARTRATE OF IRON. TARTRATE OF IRON AND AMMONIA. FERRO-TARTRATE OF AMMONIA. AMMONIÆ FERRO-TARTRAS, &c. *Prep.* Tartaric acid 1 part; iron filings 3 parts; digest in a sufficient quantity of hot water to barely cover the mixture for 2 or 3 days, observing to stir it frequently, and to add just enough water to allow the evolved gas to escape freely; then add some liquor of ammonia, and continue the stirring; dilute with water, decant, wash the undissolved portion of iron, filter the mixed liquors, and evaporate to dryness; redissolve in water, add a little more ammonia, filter, and again gently evaporate to dryness, or to the consistence of a thick sirup, when it may be spread upon hot plates of glass, or on earthenware dishes, and dried in a stove-room, as directed for citrate of iron.

Remarks. Glossy, brittle lamellæ, or irregular pieces, deep garnet-colored, almost black, very soluble in water, and possessing a sweetish and slightly ferruginous taste. By repeated re-solution and evaporation its sweetness is increased, probably from the conversion of a part of its acid into sugar. It contains more iron than a given weight of the sulphate of the same base. It is the most pleasant-tasted of all the preparations of iron, except the ammonio-citrate. (Aikin, Lond. Med. Gaz.)

IRON, BENZOATES OF. Prepared by digesting the hydrated oxides in a hot solution of the acid, or from the benzoate of an alkali and a salt of iron by double decomposition.

IRON, BRONZING OF. (See BROWNING OF GUN BARRELS, and BRONZING.)

IRON, CARBONATE OF. *Syn.* FERRI CARBONAS. This preparation is found in a crystallized state in the mineral called *Spathose iron*, and in some chalybeate waters.

Prep. Precipitate protosulphate of iron by adding a solution of carbonate of soda, well wash the green powder with water and dry it out of contact with the air. On the slightest exposure it is converted into *sesquioxide of iron.*

IRON, CARBONATE, (SACCHARINE.) *Syn.* KLAUER'S FERRUM CARBONICUM SACCHARATUM. FERRI CARBONAS SACCHARATUM. *Prep.* (P. E.) Sulphate of iron ℥iv; carbonate of soda ℥v; dissolve each separately in water 1 quart, mix the solutions, collect the precipitate, well wash it with cold water, drain on a cloth, squeeze out as much of the water as possible, and add powdered lump sugar ℥ij; mix and dry at a temperature not much above 120° F. The whole operation should be performed as quickly as possible. A sweet-tasted greenish mass or powder, consisting chiefly of carbonate of iron. It is one of the best of the chalybeates. *Dose.* 5 to 10 grs. When pure it should be "easily soluble in muriatic acid with brisk effervescence." (P. E.)

IRON, CHLORIDE OF. *Syn.* FERRI CHLORIDUM. *Prep.* I. (*Protochloride.*) Dissolve iron filings or scales in muriatic acid, evaporate and crystallize. Soluble, green crystals.

II. (*Perchloride. Sesquichloride.*) Dissolve sesquioxide or rust of iron in muriatic acid, evaporate to the consistence of a sirup, and crystallize. Red crystals.

Remarks. Neither of the preceding is absolutely pure; but by transmitting dry hydrochloric acid gas over iron heated to redness, a pure white crystalline PROTOCHLORIDE OF IRON is obtained; and by the combustion of iron wire in chlorine gas, or by passing chlorine over heated iron, the pure PERCHLORIDE OF IRON is formed. The *protochloride* is volatile at high temperatures, and the *perchloride* is dissipated by a heat a little above 212° F. The latter is soluble in water, alcohol, and ether, and is deliquescent. (See TINCT. OF SESQUICHLORIDE OF IRON.)

IRON, IODIDES OF. *Prep.* I. (*Protiodide of Iron. Iodide of do. Ioduret of do. Ferri Iodidum,* P. L. *Ferri Ioduretum.*) *a.* (P. L.) Iodine ℥vj; iron filings ℥ij; water 4½ pints; mix, boil in a sand-bath until the liquid turns to a pale green, filter, wash the residue with a little water, and evaporate the mixed liquors in an iron vessel, at 212°, to dryness.

b. (P. E.) The Scotch college orders the solution not to be filtered until evaporated to ⅕, without removing the excess of iron, and then to be filtered as quickly as possible and put into a basin, which must be surrounded with 12 times its weight of quicklime, and placed in some convenient apparatus in which it may be accurately shut in a small space not communicating with the general atmosphere. The whole must then be heated in a hot-air press, in a stove or otherwise, until the water be entirely evaporated, when the iodide of iron must be put into small dry-stoppered vials. *Product excellent.*

Remarks. A great deal has been written and said about the preparation of iodide of iron, much of which is more amusing than instructive. There is in reality very little difficulty in the process. As soon as iodine and iron are mixed together under water, much heat is evolved, and if too much water be not used the combination is soon completed, and the liquor merely requires to be evaporated to dryness, out of contact with the air, at a heat not exceeding 212°. This is most cheaply and easily performed by employing a glass flask, with a thin broad bottom and a narrow mouth, by which means the evolved steam will exclude air from the vessel. I have adopted the following formula with excellent results:—Iodine 18 oz.; iron wire or filings 6 or 7 oz.; water about 1 quart; mix in a glass or stoneware jug, agitate with an iron rod, (cautiously;) when the temperature of the liquid will rise considerably, and the combination be completed in 20 or 30 minutes, without the application of external heat. When the liquor assumes a pale green color, decant it into a glass flask with a thin bottom, wash the remaining iron with a little water, filter, and add it to that already in the flask. Apply the heat of a sand-bath, or a rose gas jet, (preferably the former,) and evaporate to the consistence of a sirup as quickly as possible, then remove the flask into a water-bath containing ½ salt and evaporate to dryness, observing not to stir the mass during the latter part of the process. The whole of the uncombined water may be known to be evaporated when vapor ceases to condense on a piece of cold glass held over the mouth of the flask; a piece of moistened starch paper occasionally applied in the same way, will indicate whether free iodine be evolved; should such be the case, the heat should be immediately lessened. When the evaporation is completed, the mouth of the flask should be stopped up by laying a piece of sheet Indian rubber on it, and over that a flat weight; the flask must be then removed, and when cold broken to pieces, the iodide weighed, and put into dry and warm stoppered wide-mouth glass vials, which must be immediately closed, tied over with bladder, and the stoppers dipped into melted wax.

Iodide of iron "evolves violet vapors by heat, and sesquioxide of iron remains. When freshly made it is totally soluble in water, and from this solution when kept in a badly stoppered vessel, sesquioxide of iron is very soon precipitated; but with iron wire immersed in it, it may be kept clear in a well-stoppered vessel." (P. L.) "Entirely soluble in water, or *nearly* so, forming a greenish solution." (P. E.) Its *dilute* solution should be colorless. (A. J. C.)

Dose. 1 to 3 grs. or more. It is tonic, stimulant, and resolvent, and has been given with advantage in debility, scrofula, and various glandular affections.

II. (*Periodide.*) Freely expose a solution of protiodide of iron to the air; or digest iodine in excess on iron under water, gently evaporate, and sublime. A deliquescent, volatile red compound, soluble in water and alcohol.

IRON, LACTATE. *Syn.* PROTOLACTATE OF IRON. FERRI LACTAS. *Prep.* I. (Rassman.) Boil iron filings in lactic acid diluted with water till gas ceases to be evolved, filter while hot into a suitable vessel, which must then be closely stopped; as the solution cools, crystals will be deposited, and these must be washed with a little cold water, then with alcohol, and lastly dried. The mother-liquor digested as before with fresh iron will yield more crystals. (Buchner's Rep.)

II. (Pagenstecher.) Lactate of lime prepared from sour milk is dissolved in water, and carbonate of ammonia added till it ceases to produce a precipitate; the liquid is now filtered, and concentrated by heat till it acquires the consistence of a sirup; it is then mixed with 6 times its weight of

rine gas, exhibited by adding 5 or 6 drops of aqueous chlorine to the water (tepid) of the inhaler, which should be of glass. Employed in France for phthisis, but seldom used in England. 4. *Vapor of iodine*, administered as the last, and occasionally used in phthisis. 5. *Oxygen and hydrogen gases*, alone or diluted with air, employed in asthma and phthisis, by means of a bladder and mouth-piece. 6. *Carbonic acid gas and nitrous oxide*, occasionally used as the last in phthisis.

INJECTION. *Syn.* INJECTIO, (*Lat.*, from *injicio*, to cast into.) Liquid medicines thrown into the cavities of the body by means of a syringe or elastic bag. Those thrown into the rectum are commonly called *clysters*, or *enemata*. (See ENEMA.) The following are the principal injections employed in medical practice at the present day:—

INJECTION FOR DEAFNESS. *Syn.* INJECTIO ACOUSTICA. *Prep.* I. Ox gall 3 dr.,; balsam of Peru 1 dr.; mix.

II. Oil of almonds or olives 2 oz.; oil of amber 20 drops; tincture of castor 1 dr.; spirit of camphor ½ dr.; laudanum 3 drops; mix.

INJECTION, LITHONTRIPTIC. *Syn.* INJ. LITHONTRIPTICA. *Prep.* (Chevallier.) Carbonate of soda ʒj; Castile soap ℥ij; water f℥xij; dissolve. For calculus.

INJECTION OF ACETATE OF AMMONIA. *Syn.* INJ. AMMONIÆ ACETATIS. *Prep.* (P. C.) Liquor of acetate of ammonia ℥j; water ℥iij; mix.

INJECTION OF ALUM. *Syn.* INJ. ALUMINIS. *Prep.* I. (Collier) *a.* Alum 18 grs.; rose-water f℥vj; for the urethra.—*b.* Alum ʒiij; water 1 quart; for the vagina.

II. (Brande.) Compound liquor of alum ʒvj; water f℥viss; mucilage ℥ss.

III. (P. C.) Alum 4 grs.; rose-water ℥iv. All the above are astringent.

INJECTION OF AMMONIA. *Syn.* INJ. AMMONIÆ. *Prep.* (Lavagna.) Liquor of ammonia 8 to 12 drops; milk ℥ij; mix. Stimulant and emollient.

INJECTION OF BICHLORIDE OF MERCURY. *Syn.* INJ. HYDRARGYRI BICHLORIDI. INJ. CORROSIVI SUBLIMATI. *Prep.* I. (P. C.) Corrosive sulimate 8 to 12 grs.; water 1 quart.

II. (P. H.) To the last add wine of opium f℥j.

III. Corrosive sublimate 5 grs.; rose-water 2 oz. Used to promote a healthy action, and to prevent infection.

INJECTION OF CALOMEL. *Syn.* INJ. CALOMELANOS. *Prep.* (P. C.) Calomel ʒss; quince mucilage ℥iv.

INJECTION OF CHLORINE. *Syn.* INJ. CHLORINATA. *Prep.* Liquor of chloride of soda ʒj; water ℥ij. As above.

INJECTION OF COPAIBA. *Syn.* INJ COPAIBÆ. *Prep.* (P. C.) Balsam of copaiba ʒij; mucilage ℥ss; lime water ℥iv; make an emulsion. Used in diseases of the mucous membranes of the urethra and vagina.

INJECTION OF ACETATE OF COPPER. *Syn.* INJ. CUPRI ACETATIS. *Prep.* (P. C.) Verdigris 10 grs.; oil of almonds ℥iv; triturate until dissolved, then strain.

INJECTION OF ACETATE OF LEAD. *Syn.* INJ. PLUMBI ACETATIS. *Prep.* (Collier.) Sugar of lead 40 grs.; rose-water ℥viij.

INJECTION OF AMMONIATED COPPER. *Syn.* INJ. CUPRI AMMONIATI. INJ. CUPRI AMMONIO-SULPHATIS. *Prep.* I. (P. C.) Liquor of ammonio-sulphate of copper 20 drops; rose-water ℥iv.

II. (Swediaur.) Ammonio-sulphate of copper 5 grs.; rose-water ℥viij.

INJECTION OF SULPHATE OF COPPER. *Syn.* INJ. CUPRI SULPHATIS. *Prep.* Sulphate of copper 5 grs.; rose-water ℥iv.

INJECTION OF SULPHATE OF COPPER, (COMPOUND.) *Prep.* To the last add solution of diacetate of lead 20 drops. The above cupreous injections are all mildly detergent and escharotic.

INJECTION OF CUBEBS. *Syn.* INJ. CUBEBÆ. *Prep.* Cubebs, in powder, ℥j; extract of belladonna ʒj; boiling water f℥xvj; infuse in a covered vessel, and strain. In diseases of the mucous membranes. Irritant and narcotic.

INJECTION OF LEAD. *Syn.* INJ. PLUMBI. *Prep.* Liquor of diacetate of lead ʒss; rose-water ℥j.

INJECTION OF LEAD AND OPIUM. *Syn.* INJ. PLUMBI OPIATA. *Prep.* (Wendt.) Aqueous extract of opium 1½ gr.; mucilage ʒij; solution of diacetate of lead 4 drops; water ℥ij The above are cooling, sedative, and anodyne.

INJECTION OF MERCURY. *Syn.* INJ. HYDRARGYRI. *Prep.* I. (P. C.) Quicksilver ʒj; gum ℥iss; rub till combined, then add water ℥iss.

II. (E. H.) Quicksilver and balsam of copaiba, of each ʒiv; yelk of 1 egg; rose-water ½ a pint. As last.

INJECTION OF MORPHIA. *Syn.* INJ. MORPHIÆ. *Prep.* (Brera.) Morphia 2 grs.; oil of almonds ℥j; dissolve. Anodyne and emollient.

INJECTION OF MURIATIC ACID. *Syn.* INJ. ACIDI MURIATICI. *Prep.* (P. C.) Muriatic acid 8 drops; water ℥iv.

INJECTION OF NITRATE OF SILVER. *Syn.* INJ. ARGENTI NITRATIS. *Prep.* I. (Collier.) Nitrate of silver 2 grs.; rose-water 1 oz.; dissolve.

II. (Jewell.) Nitrate of silver 12 grs.; distilled water f℥vj. For fistulous sores.

INJECTION OF OIL OF ALMONDS. *Syn.* INJ. OLEOSA. *Prep.* (P. C.) Oil of almonds ʒiv; solution of diacetate of lead 8 drops; mix. Emollient and sedative.

INJECTION OF OPIUM. *Syn.* INJ. OPIATA. *Prep.* I. (P. C.) Laudanum 40 drops; water ℥iv.

II. (Fr. H.) Wine of opium ʒj; barley water 1 pint. Anodyne.

INJECTION OF TANNIN. *Syn.* INJ. TANNINI. INJ. ACIDI TANNICI. *Prep.* (Richard.) Tannin ℈j; water ℥viij; dissolve. Astringent.

INJECTION OF TEA. *Syn.* INJ. THEÆ. *Prep* (P. C.) Green tea ʒj; boiling water ℥viij; infuse. Astringent; frequently used in fluor albus.

INJECTION OF TURPENTINE. *Syn.* INJ. TEREBINTHINÆ. *Prep.* (St. B. H.) Olive oil f℥xij; oil of turpentine f℥iss. Vermifuge.

INJECTION OF WINE. *Syn.* INJ. VINI. *Prep.* (Earle.) Red wine ℥xij; water ℥iv; mix Astringent; in hydrocele.

INJECTION OF WHITELEAD. *Syn.* INJ. CERUSSÆ COMP. *Prep.* (P. C.) Compound

powder of carbonate of lead ℈j; sulphate of zinc 6 grs.; rose-water ℥iv.

INJECTION OF ACETATE OF ZINC. *Syn.* INJ. ZINCI ACETATIS. *Prep.* Sulphate of zinc ʒj; acetate of lead ℈iv; water 1 pint; mix, and filter.

INJECTION OF SULPHATE OF ZINC. *Syn.* INJ. ZINCI SULPHATIS. *Prep.* (P. C.) Sulphate of zinc 4 to 10 grs.; water f℥iv.

INK. *Syn.* WRITING FLUID. ATRAMENTUM, (*Lat.*) ENCRE, (*Fr.*) TINTE, (*Ger.*) Colored liquid employed for writing with a pen. Ink is made of various substances and colors, of which the following are the principal:—

INK, BLACK. *Prep.* I. Bruised Aleppo nutgalls 12 lbs.; water 6 galls.; boil in a copper vessel for 1 hour, adding water to make up for the portion lost by evaporation; strain and again boil the galls with water 4 gallons, for ½ an hour, strain off the liquor and boil a third time with water 2½ gallons, and strain; mix the several liquors, and while still hot add green copperas, coarsely powdered, 4 lbs.; gum arabic bruised small 3½ lbs.; agitate until dissolved, and after defecation, strain through a hair sieve, and keep it in a bunged-up cask for use. *Product.* 12 gallons, very fine and durable.

II. Campeachy logwood chips 3 lbs.; bruised galls 9 lbs.; boil in water as above, and to the mixed liquors add gum arabic and green copperas, of each 4 lbs.; to produce 16½ galls. of ink. *Quality.* Very good.

III. (Lewis.) Bruised galls, 3 lbs.; gum and sulphate of iron, of each 1 lb.; vinegar 1 gall.; water 2 galls.; macerate with frequent agitation for 14 days. To produce 3 galls. Fine quality.

IV. (M. Ribaucourt.) Bruised galls 1 lb.; logwood, in thin chips, and sulphate of iron, of each ½ lb.; gum 6 oz.; sulphate of copper and sugar candy, of each 1 oz. Boil the galls and logwood in 2½ galls. of water for 1 hour, or until reduced to one half, strain, add the other ingredients, and stir until dissolved, then decant and preserve in stone or glass bottles, well corked. Full colored.

V. (M. Desormeaux, jun.) Logwood chips 4 oz.; water 6 quarts; boil 1 hour and strain 5 quarts; add bruised galls 1 lb.; sulphate of iron calcined to whiteness 4 oz.; brown sugar 3 oz.; gum 6 oz.; acetate of copper ¼ oz.; agitate twice a day for a fortnight, then decant the clear, bottle and cork up for use.

VI. Bruised galls 2 lbs.; logwood, green copperas, and gum, of each 1 lb.; water 6 gallons; boil the whole of the ingredients in the water for 1½ hours, and strain 5 galls. Good, but not fine.

VII. Bruised galls 1 lb.; logwood 2 lbs.; common gum ¾ lb.; green copperas ½ lb.; water 5 gallons; boil. Common, but fit for ordinary purposes.

VII. (*Patent.*) Logwood shavings and powdered galls, of each 2 lbs.; green vitriol 1 lb.; gum ½ lb.; pomegranate bark ¼ lb.; water 1 gallon; infuse 14 days, with frequent agitation.

VIII. (*Asiatic.*) The same as the last. Both write pale, but turn very black by keeping, and flow well from the pen.

IX. (*Used in the Prerogative Office.*) Bruised galls 1 lb.; gum arabic 6 oz.; alum 2 oz.; green vitriol 7 oz.; kino 3 oz.; logwood raspings or sawdust 4 oz.; water 1 gallon; macerate as last. *Said* to write well on parchment.

X. (*Japan.*) This is a black and glossy kind of ink, which may be prepared from either of the above receipts by calcining the copperas until white or yellow, or by sprinkling it (in powder) with a little nitric acid before adding it to the decoction, (preferably the former,) by which the ink is rendered of a full black as soon as made. The glossiness is given by using more gum. Flows less easily from the pen, and is less durable than ink that writes paler and afterwards turns black.

XI. (*Exchequer.*) Bruised galls 40 lbs.; gum 10 lbs.; green sulphate of iron 9 lbs.; soft water 45 gallons; macerate for 3 weeks, employing frequent agitation. "This ink will endure for centuries."

Remarks. The ink prepared by the first formula is the most durable, and will bear dilution with *nearly* its own weight of water, and still be equal to the ordinary ink of the shops. I have writing by me that was executed with this kind of ink upwards of 50 years ago, which still possesses a good color. The respective qualities of the others are noticed at the foot of each.

According to the most accurate experiments on the preparation of black ink, it appears that the quantity of sulphate of iron should not exceed one-third part of that of the galls, by which an excess of coloring matter, which is necessary for the durability of the black, is preserved in the liquid. Gum, by shielding the writing from the action of the air, tends to preserve the color, but if much is employed, the ink flows languidly from *quill* pens, and scarcely at all from *steel* pens. The latter require a very limpid ink. The addition of sugar increases the flowing property of ink, but makes it dry more slowly, and frequently passes into vinegar, when it acts injuriously on the pen. Vinegar, for a like reason, is not calculated for the menstruum.

The addition of a few bruised cloves, or a little oil of cloves; or still better, a few drops of creosote, will effectually prevent any tendency to *mouldiness* in ink. The best *blue* galls should alone be employed in making ink.

Sumach, logwood, and oak bark, are frequently substituted for galls in the preparation of *common* ink. When such is the case, only about one-sixth or one-seventh of their weight of copperas should be employed.

The most permanent (tanno-gallate) inks are those which contain the proper quantity of oxide of iron, at the minimum of oxidizement, in a state of solution or minute suspension, by which means, not only does a larger quantity of the fluid flow from the pen on to a given space, but it also sinks into the substance of the paper, by which the stain is rendered more permanent and less easily removed by attrition. Such inks are uniformly pale until exposed to the air for some days, when they acquire their full color. When the iron is at the maximum of oxidizement, as is the case when calcined copperas is employed, the ink writes of a full black at first, but from its coloring matter being merely a suspended precipitate, it rests upon the surface of the paper without sinking into it, and may consequently be more easily erased than the former. Its black color is also more liable to fade

The very general use of steel pens has caused a corresponding demand for easy flowing inks, many of which have been of late years introduced under the title of "*writing fluids*," or "*steel-pen ink*." These are mostly prepared from galls in the preceding manner, but a less quantity of gum is employed. The blue writing fluids which either maintain their color or turn black by exposure, are prepared from the ferrocyanide of potassium, or from indigo. (See WRITING FLUIDS.)

INKS, BLUE. *Syn.* BLUE WRITING FLUIDS. *Prep.* I. Indigo dissolved in oil of vitriol, and added to water until a proper shade of color is produced, as much potash or soda being also added as the liquid will bear without dropping its color.

II. Powdered Prussian blue 1 oz.; concentrated muriatic acid 1½ to 2 oz.; mix in a matrass or glass bottle, and after 24 or 30 hours, dilute the mass with a sufficient quantity of water.

III. (Mohr.) Pure Prussian blue 6 parts; oxalic acid 1 part; triturate with a little water to *a perfectly smooth* paste, then dilute with a proper quantity of soft water. Both this and the last produce a superb liquid blue, admirably calculated for writing with, when the process is properly managed and the Prussian blue *pure;* but it will not succeed with every sample of that pigment. A little gum may be added, if required, to prevent the fluid spreading on the paper.

INKS, COLORED. Inks of various colors may be made from a strong decoction of the ingredients used in dyeing, mixed with a little alum and gum arabic. Any of the ordinary water-color cakes employed in drawing, diffused through water, may also be used for colored inks.

INK, COPYING. This is prepared by adding a little sugar to ordinary black ink. Writing executed with this ink may be copied within the space of 5 or 6 hours, by passing it through a press in contact with thin unsized paper, when a reversed copy will be obtained, but which will read in proper order by holding the back of the copy towards you. Writing executed with this ink may be copied after any lapse of time, by employing damp copying paper. A warm flat-iron passed over the latter laid upon the writing, may be substituted for the use of the copying press.

INK, GOLD. *Prep.* Honey and gold leaf equal parts; grind together upon a painter's porphyry slab with a muller, until the gold is reduced to the finest possible state of division, and the mass becomes perfectly homogeneous, when it must be agitated with 20 or 30 times its weight of hot water, and then allowed to settle and the water poured off; this process must be repeated with fresh water 2 or 3 times, when the gold must be dried and then mixed up with a little weak gum water for use. The brilliancy of writing performed with this ink is considerable, and may be increased by burnishing. Gold ink may also be made by mixing precipitated gold powder with a little gum water.

INK, GREEN. *Prep.* I. (Klaproth.) Verdigris 2 oz.; cream of tartar 1 oz.; water ½ a pint; boil to one half and filter.

II. Make a strong solution of binacetate of copper in water, or of verdigris in vinegar.

INK, INDELIBLE. *Syn.* MARKING INK. PERMANENT INK. *Prep.* I. Nitrate of silver ½ oz.; hot distilled water ¾ oz.; when cooled a little, add mucilage ½ oz., and sap green or sirup of buckthorn to color; mix well. The linen must be first moistened with "*liquid pounce,*" or "*the preparation,*" as it is commonly called, dried, and then written on with a clean quill pen. This ink will bear dilution if not wanted very black.

The pounce or preparation. Carbonate of soda 1 oz. to 1½ oz., water 1 pint; color with a little sap green or sirup of buckthorn.

II. (*Without preparation.*) Nitrate of silver 1 to 2 dr.; water ¾ oz.; dissolve, add as much of the strongest ammonia water as will dissolve the precipitate formed on its first addition, then further add mucilage 1 or 2 drachms, and a little sap green to color. Writing executed with this ink turns black on being passed over a hot Italian iron.

III. Terchloride of gold 1½ drachms; water 7 drs.; mucilage 1 dr.; sap green to color; mix. To be written with on a ground prepared with a weak solution of protomuriate of tin, and dried.

Remarks. The products of the first two of the above forms constitute the marking inks of the shops. They have, however, no claim to the title of "indelible ink"—"*which no art can extract without injuring the fabric*"—as is generally represented. On the contrary, they may be discharged with almost as much facility as common iron-moulds. This may be easily and cheaply effected with either chlorine or ammonia, without in the least injuring the texture of the fabric to which it may be applied. From a great number of experiments which I have lately made on the subject, I find that this kind of ink may be discharged from even the finest muslins, without impairing their quality. The only precaution required, is that of rinsing them in clean water immediately after the operation. (See Chem., ii. 210.) The "*marking ink without preparation,*" is also more easily extracted than that "*with preparation;*" and the former has also the disadvantage of not keeping so well as the latter, and of depositing a portion of fulminating silver, under some circumstances, which renders its use dangerous. The best marking ink made at the present day is the HERALDIC INK. This ink is either applied with a stamp or pen, and by the former linen may be marked with great facility and neatness.

INK, INCORRODIBLE. *Prep.* I. (Mr Close.) *a.* Powdered copal 25 grs.; oil of lavender 200 grs.; dissolve by a gentle heat, add lampblack 3 grs., indigo 1 gr.—*b.* Powdered copal 1 part; oil of lavender 7 parts; vermilion 4 parts; as last.

II. (Mr. Hausman.) Genuine asphaltum 1 part; oil of turpentine 4 parts; dissolve, and add lampblack or blacklead to bring it to a proper consistence. Resists the action of iodine, chlorine, alkalis, and acids.

III. (Sheldrake.) Asphaltum dissolved in amber varnish and oil of turpentine, and colored with lampblack.

IV. (Cooley.) Asphaltum 1 part; oil of turpentine 4 parts; dissolve, and color with printer's ink. Very permanent.

Remarks. The above are frequently called "*Indelible inks.*" They are employed for writing labels on bottles containing strong acids and alkaline solutions. The second and last are very permanent, and are capable of resisting all the opera-

tions of dyeing and bleaching, and at once offer a cheap and excellent material for marking linen, &c., as they cannot be dissolved off by any menstrua that will not destroy the fabric. They must be employed with stamps or types, which is a neater method than that with a brush or pen.

V. (M. Bezanger.) This patent ink consists of lampblack and caustic soda, mixed with gelatin and caustic soda. It is said to be indelible, and to resemble China ink. (Moniteur Industriel.)

VI. Indian ink, ground up with ordinary black writing ink, forms a cheap indelible ink for common purposes. It will resist the action of chlorine, most acids, and even ablution with a brush or sponge.

INK, INDIAN. *Syn.* China Ink. Indicum. Atramentum Indicum. *Prep.* I. (Proust.) Purify real lampblack by washing it with potash lye, dry, make it into a thick paste with a solution of glue, mould and dry.

II. (M. Merimée.) Dissolve glue in water, add a strong solution of nutgalls, and wash the precipitate in hot water; then dissolve it in a spare solution of glue, filter, evaporate to a proper thickness, and form it into a paste as before, with purified lampblack.

III. (Cooley.) Boil a weak solution of glue at a high temperature in a Papin's digester for 2 hours, then boil it in an *open* vessel for 1 hour more, filter and evaporate to a proper consistence, then make a paste as before with purified lampblack, adding a few drops of essence of musk and about half as much essence of ambergris to perfume; lastly, mould into cakes, and when dry, ornament them with Chinese characters and devices. Quality very superior; does not gelatinize in cold weather like ordinary imitations.

IV. (Gray.) Pure lampblack made up with asses' skin glue, and scented with musk.

V. Seed lac ½ oz.; borax 1 dr.; water ½ pint; boil to 8 oz., filter, and make a paste with pure lampblack as before. Good; when dry it resists the action of water.

Remarks. The Chinese do not use glue in the preparation of their ink, but a glutinous vegetable juice or solution, which at once imparts brilliancy and durability. Starch converted into gum by means of sulphuric acid, or British gum, has been recommended as a substitute, (M. Merimée.) But from information afforded me by a gentleman who has resided some years in China, I am led to believe that the liquid employed by the Chinese to convert their black pigment into a paste, is either an infusion or decoction of some seeds abounding in mucilage, and not the juice of a plant as usually supposed. Indian ink is chiefly employed by artists, but it has been occasionally given as a medicine, dissolved in water or wine, in hemorrhages and stomach complaints. *Dose.* 1 to 2 dr.

INK, MARKING. Ink bottoms. Used by packers for marking bales, boxes, &c.

INK, PERPETUAL. *Prep.* Pitch 3 lbs.; melt over the fire, then add lampblack 1 lb.; mix well. *Used* in a melted state to fill the letters on tombstones, marbles, &c. Without actual violence it will endure as long as the stone itself.

INK, RED. *Prep.* I. Ground Brazil wood 8 oz.; vinegar 10 pints; macerate for 4 or 5 days; boil in a tinned-copper vessel to one half, then add to each alum 8 oz., and gum 3 oz.; dissolve.

II. As the last, but use water or beer instead of vinegar.

III. Stale beer 1 pint; cochineal, bruised, 1 dr.; gum arabic 1 oz.; ground Brazil and alum, of each 2 oz.; boil or macerate with agitation for 14 days, and strain.

IV. Pure carmine 12 grs.; water of ammonia 3 oz.; dissolve, then add powdered gum 18 grs. Half a drachm of powdered drop lake may be substituted for the carmine where expense is an object. Color *superb.* (Buchner's Repert.)

V. Cochineal, in powder, 1 oz.; hot water ½ pint; digest, and when *quite cold,* add spirit of hartshorn ½ pint, or liquor of ammonia 1 oz.; dilute with 3 or 4 oz. of water; macerate for a few days longer, then decant the clear. *Color,* very fine.

INK, SILVER. This is prepared like gold ink.

INKS, SYMPATHETIC. Fluids which, when employed for writing on paper, do not render the marks visible till acted on by some reagent. Sympathetic inks are commonly employed as the instruments of secret correspondence, and frequently escape detection, but by heating the paper before the fire until it is nearly scorched, the whole of them may be rendered visible.

The following are the most common and amusing sympathetic inks:—1. Sulphate of copper and sal ammoniac, equal parts, dissolved in water; writes colorless but turns yellow when heated.—2. Onion juice, like the last.—3. A weak infusion of galls; turns black when moistened with weak copperas water.—4. A weak solution of sulphate of iron; turns blue when moistened with a weak solution of prussiate of potash, and black with infusion of galls.—5. The diluted solutions of nitrate of silver and terchloride of gold; darkens when exposed to the sunlight.—6. Aquafortis, spirits of salts, oil of vitriol, common salt or saltpetre dissolved in a large quantity of water; turns yellow or brown when heated.—7. Solution of nitromuriate of cobalt; turns green when heated, and disappears again on cooling.—8. Solution of acetate of cobalt, to which a little nitre has been added; becomes rose-colored when heated, and disappears on cooling.

INK, YELLOW. *Prep.* I. Boil French berries ½ lb., and alum 1 oz., in water 1 quart, for half an hour or longer, then strain and dissolve in the hot liquor, gum arabic 1 oz.

II. Gamboge in coarse powder 1 oz.; hot water 5 oz.; dissolve, and when cold, add spirit ½ oz. or 1 oz.

INK, TO RESTORE FADED. Writing rendered illegible by age may be restored by moistening it by means of a feather with an infusion of galls, or a solution of prussiate of potash slightly acidulated with muriatic acid, observing so to apply the liquid as to prevent the ink spreading.

INK STAINS may be readily removed from white articles by means of a little salt of lemons, diluted muriatic acid, oxalic acid, or tartaric acid, and hot water; or by means of a little solution of chlorine or chloride of lime. The spots should be afterwards *thoroughly* rinsed in warm water, before touching them with soap. *Marking ink* may be removed by ammonia water, solution of chloride of lime, liquid chlorine, or iodine.

INOCULATION. (In Surgery.) The inser-

tion of poisonous or infectious matter into any part of the body for the purpose of propagating a mild form of disease, and thus preventing or lessening the virulence of future attacks. The word is generally applied to the insertion of the virus of the common smallpox, by which a milder form of the disease is produced, than when it is caught in the natural way. Vaccination has now very generally superseded inoculation.

Oper. Inoculation is performed by inserting the point of a lancet wetted with smallpox matter under the cuticle, and afterwards gently rubbing the moistened point over the scratch.

INULIN. *Syn.* Alantin. Menyanthin. Elecampin. Dahlin. Datiscin. A peculiar starch-like substance first obtained by Rose from the inula helenium or elecampane. It may be obtained by boiling elecampane in 4 times its weight of water, and allowing the decoction to repose for a short time. It is distinguished from starch by the precipitate formed in the cold decoction by an infusion of gall nuts, not disappearing until the liquid is heated to above 212°, while the precipitate from starch redissolves at 122° F. Inulin is soluble in boiling water, but separates as the liquid cools.

IODATE. *Syn.* Iodas, (*Lat.*) A compound formed of iodic acid and a base in definite proportion. The iodates resemble the chlorates of the corresponding bases. They may be easily recognised by the development of free iodine when treated with sulphurous, phosphorous, and hydrochloric acids, and other deoxydizing agents, and by their solutions being converted into iodides when treated with sulphureted hydrogen. They are all of sparing solubility, and many are quite insoluble in water. All the insoluble iodates may be obtained from the iodate of potassa, by decomposing it in solution by a solution of a soluble salt of the base.

IODATE OF MERCURY. *Syn.* Hydrargyri Iodas. *Prep.* Precipitate a solution of mercury in nitric acid with another of iodate of potassa. A yellow powder resembling Turpeth's mineral.

IODATE OF POTASSA. *Syn.* Potassæ Iodas. *Prep.* I. Neutralize a hot solution of potassa with iodine, evaporate to dryness by a gentle heat, powder, and digest in alcohol, to dissolve out the iodide of potassium, then dissolve the residue in hot water and crystallize.

II. (M. Henry, jun.) Iodide of potassium 2 parts; chlorate of potassa 3 do.; fuse the iodide of potassium in a large Hessian crucible; remove it from the fire, and add, while still fluid, successive portions of the powdered chlorate of potassa, stirring well after each addition. When the matter ceases to froth up, cool, powder, and digest in tepid water to dissolve out the chloride of potassium, when the residue may be dissolved in hot water and crystallized.

Remarks. Iodate of potassa has been recommended in bronchocele. A biniodate and teriodate of potassa may also be formed, but possess little interest.

IODATE OF SILVER. *Syn.* Argenti Iodas. *Prep.* From a solution of nitrate of silver, as Iodate of Mercury. A white powder, soluble in ammonia.

IODIC ACID. *Syn.* Oxiodine. Acidum Iodicum. An acid compound of iodine and oxygen discovered by Gay Lussac and Davy.

Prep. I. Dissolve iodate of soda in sulphuric acid in considerable excess, boil for 15 minutes, and set the solution aside to crystallize. *Pure.*

II. (M. Boursen.) Iodine 1 part; *strongest* (monohydrated) nitric acid 4 parts; mix, and apply a gentle heat until the color of the iodine disappears, then evaporate to dryness and leave the residuum in the open air at a temperature of about 15° C. When by attracting moisture it has acquired the consistence of a sirup, put it into a place where the temperature is higher and the air drier, when in a few days very fine white crystals of rhomboidal shape will form. (Compt Rend. xxiv.) *Pure.*

III. (J. L. Lassaigne.) Treat a solution of nitrate of silver with an excess of iodine, filter, evaporate to dryness, and proceed as last. *Pure.*

IV. Diffuse iodine in powder through distilled water, then pass a current of chlorine through the liquid; evaporate.

Remarks. Iodic acid is decomposed into oxygen and iodine by a heat of about 450 to 500° F. It is very soluble in water and deliquescent; it detonates with inflammable bodies like the nitrates and chlorates; with the bases it forms salts called Iodates. The Iodate of soda above alluded to may be made in the same way as the iodate of potassa. Iodic acid is used as a test for morphia and sulphurous acid. (See Iodate.)

IODIDE. *Syn.* Iodure. Ioduret. Hydriodate. Iodidum; Iodureтum; Hydriodas, (*Lat.*) A compound of iodine and a base.

IODIDE OF ARSENIC. *Syn.* Arsenici Iodidum. *Prep.* (Wackenroder.) Sublimed metallic arsenic 1 gr.; pure iodine 6 grs.; water 2 drachms; digest together, evaporate by a gentle heat, and as soon as the mass begins to solidify, the temperature must not exceed 86° F. A red crystalline mass is obtained. (See p. 74.)

IODIDE OF ARSENIC, SOLUTION OF. *Prep.* (Wackenroder.) Dissolve the product of the above process in water 6 oz.; every drachm of which will contain one-forty-eighth gr. of metallic arsenic, and one-tenth gr. (nearly) of iodine.

IODIDE OF CYANOGEN. *Prep.* (Mitscherlich.) Gently heat a mixture of bicyanide of mercury, iodine, and water, in a retort, when iodide of cyanogen will sublime and collect in the neck of the retort, under the form of a crystalline snow or needles. It volatilizes at 100° F., and is soluble in water, ether, and alcohol.

IODIDE OF NITROGEN. *Syn.* Teriodide of Nitrogen. A dark powder, which subsides when iodine is put into liquor of ammonia. It may be more safely and conveniently made by saturating alcohol of sp. gr. ·852 with iodine, adding a large quantity of ammonia, and agitating the mixture; water must now be added, when the iodide will be precipitated, and must be carefully washed with cold distilled water. *** It detonates violently as soon as it becomes dry, and by slight pressure, or friction, even when moist. It should only be prepared in very *small quantities* at a time.

IODIDES OF PHOSPHORUS. *Prep.* I. (*Protiodide.*) Phosphorus 1 part; iodine 7 parts; mix in a close vessel, placed in a freezing mixture

Orange colored; melts at 212°; volatile, and decomposed by water.

II. (*Sesquiodide.*) Phosphorus 1 part; iodine 12 parts; as last. A dark gray semi-crystalline mass, liquid at 84° F.

III. (*Periodide.*) Phosphorus 1 part; iodine 20 parts; as last. A black mass, fusible at about 115° F. All the above yield hydriodic acid and phosphorous or phosphoric acid, by contact with water.

IODIDE OF SULPHUR. *Syn.* SULPHURIS IODIDUM. *Prep.* Iodine 4 parts; sulphur 1 part; place the mixture in a loose-corked flask, immerse it in a water bath, and, as soon as it melts, stir it with a glass rod, then place in the cork, remove the bath from the fire, and let the two cool together. When cold, break the iodide into pieces, and place it in a wide-mouthed stoppered bottle. In this way a beautiful semi-crystalline, dark gray mass, resembling antimony, is obtained.

Remarks. An ointment made with 5 parts of iodide of sulphur, and 96 of lard, or 8 of the iodide and 144 of lard, has been recommended by Biett in tuberculous affections of the skin. Iodide of sulphur stains the skin like iodine, and is readily decomposed by contact with organic substances.

IODIDE OF STARCH. *Syn.* AMYLI IODIDUM. *Prep.* (Dr. Buchanan.) Iodine 24 grs.; water q. s.; triturate; then add starch ℥j; again triturate, until the mass assumes a uniform color. One of the most worthless of the preparations of iodine.

IODIDES, DOUBLE. Several of these compounds have been described by Bonsdorff, Boullay, and Liebig, many of which are formed by dissolving the iodides in a solution of iodide of potassium, when crystals of the double salt are deposited as the liquid cools, or on evaporation. They possess but little interest in a practical point of view.

IODINE: *Syn.* IODE, (*Fr.*) IOD, (*Ger.*) IODIUM; IODINIUM; IODINA, (*Lat.*, from ιωδης, *violet colored*, on account of the color of its vapor.) A chemical element, accidentally discovered in 1812, by De Courtois, a saltpetre manufacturer at Paris, but was first described by Clement, in 1813, and its precise nature was soon afterwards determined by Sir H. Davy and M. Gay Lussac. It is found both in the animal, vegetable, and mineral kingdoms, but exists in greatest abundance in the vegetable family algæ. It is principally manufactured in the neighborhood of Glasgow, from the mother waters of kelp.

Prep. I. Extract all the soluble part of kelp by water, and crystallize the soda by evaporation; to the mother lye add oil of vitriol in excess and boil the liquid, then strain it to separate some sulphur, and mix the filtered liquor with as much manganese as there was oil of vitriol used: on applying heat, the iodine sublimes in the form of grayish black scales, with a metallic lustre. The boiling is conducted in a leaden vessel; and a cylindrical leaden still, with a *very short* head, and connected with 2 or 3 large globular glass receivers, is used for the subliming apparatus. Care must be taken to watch the process, and prevent the neck of the still becoming choked with condensed iodine.

II. (Ure.) Saturate the residual liquor of the manufacture of soap from kelp, of the sp. gr. of 1·374, heated to 230° F., with sulphuric acid diluted with half its weight of water, cool, decant the clear, strain, and to every 12 fluid ounces add 1000 grs. of black oxide of manganese, in powder; put the mixture into a glass globe, or matrass with a wide neck, over which invert another glass globe, and apply heat with a charcoal chauffer; iodine will sublime very copiously, and condense in the upper vessel, which as soon as warm should be replaced by another; and the two globes thus applied in succession, as long as violet vapor arises. It may be washed out of the globes with a little cold water. A thin disc of wood, having a hole in its centre, should be placed over the shoulder of the matrass, to prevent the heat from acting on the globular receiver. On the large scale, a leaden still, as before described, may be employed, and receivers of stoneware economically substituted for glass ones. The addition of the sulphuric acid should be made in a wooden or stoneware basin or trough. *Prod.* 12 oz. yield 80 to 100 grs.

III. (Soubeiran.) Add a mixed solution of 1 part of sulphate of copper and 2¼ parts of protosulphate of iron to the mother liquors of the soda works, as long as a white precipitate is thrown down; the precipitate (diniodide of copper) must be then collected, dried, mixed with its own weight of finely-powdered black oxide of manganese, and distilled by a strong heat in a retort; dry iodine will pass over. By the addition of sulphuric acid with the manganese, a less heat is required.

Remarks. The top of the leaden still employed for the preparation of iodine, is usually furnished with a moveable stopper, by which the process may be watched, and additions of manganese or sulphuric acid made, if required. To render it pure, it should be dried as much as possible, and then resublimed in glass or stoneware.

Prop. Iodine is usually met with under the form of semicrystalline lumps, having a metallic lustre, or in micaceous, friable scales, somewhat resembling gunpowder. It has a grayish-black color, a hot acrid taste, and a disagreeable odor, not much unlike that of chlorine. It fuses at 225° F., volatilizes slowly at ordinary temperatures, boils at 347°, and when mixed with water rapidly rises along with its vapor at 212°. It dissolves in 7000 parts of water, and freely in alcohol and ether. It may be crystallized in large rhomboidal plates, by exposing to the air a solution of it in hydiodic acid. Iodine, like chlorine, has an extensive range of affinity; with the salifiable bases, it forms compounds termed *Iodides*, *Iodurets*, or *Hydriodates*; and it destroys vegetable colors. Many of the iodides are used in medicine.

Pur. The iodine of commerce is usually that of the first sublimation, and commonly contains 12 to 20% of water. Some of the foreign iodine, obtained by precipitation with chlorine, without subsequent sublimation, frequently contains ¼th water, has a leaden-gray color, and a sensible odor of chlorine. Coal, plumbago, oxide of manganese, crude antimony, and charcoal, are also frequently mixed with it. *Water* may be detected by the loss of weight it suffers when exposed to strong pressure between the folds of bibulous paper,—*chlorine*, by the odor, and the other substances

mentioned above, by digestion in spirits of wine, when the iodine will dissolve, leaving the impurities behind. Before use as a medicine, "it must be dried, by being placed in a shallow basin of earthenware, in a small confined space of air, with 10 or 12 times its weight of fresh-burnt lime, till it scarcely adheres to the side of a dry bottle." Pure iodine "is entirely vaporizable; 39 grs., with 9 grs. of quicklime, and ℥iij of water, when heated short of ebullition, slowly form a perfect solution, which is *yellowish* or *brownish*, if the iodine be *pure*, but colorless, if it contains more than 2§ of water, or other impurity." (P. E)

Uses, Dose, &c. Iodine is chiefly used as a medicine, and a chemical test. Its physiological action, when applied externally, is that of an irritant, and, when swallowed in large doses, it produces powerful gastric irritation. In small doses, it appears to be both alterative and tonic, rapidly diffusing itself through the body, and exerting a stimulating action on the organs of secretion. It is also said to be diuretic, and in some cases to have produced diaphoresis and salivation. It exerts a powerful anti-aphrodisiac action, and instances are recorded where absorption of the mammæ and testæ have followed its exhibition. (Hufeland's Journal.) *Dose.* ½ gr. dissolved in spirit, or in water, by means of an equal weight of iodide of potassium. It is seldom exhibited alone, being usually combined with the latter substance, and in fact this salt is now generally preferred by practitioners. Iodine, in medicinal doses, has been exhibited in the following diseases, as well as in most others depending on an imperfect action of the absorbents, or accompanied by induration or enlargement of individual glands or organs:—INTERNALLY, in *bronchocele, goître, Derbyshire neck, scrofula, ovarian tumors, enlargement or induration of the lymphatic, prostate, and parotid glands, amenorrhœa, leucorrhœa, diseases of the muco-genital tissues, phthisis, chronic nervous diseases, lepra, psoriasis, chronic rheumatism, dropsies, hydrocele, &c.*:—EXTERNALLY, in *scrofula, numerous skin diseases, (especially the scaly,) erysipelas, diseased joints, chilblains, burns, scalds, various wounds, to check ulceration, to promote absorption, &c.* It is applied externally in the form of ointment, solution, or tincture.

Tests. Free iodine may be recognised by—1. The violet color of its vapor.—2. Striking a blue color with starch: this test is so delicate that water containing only $\frac{1}{450000}$ part of iodine, acquires a perceptible blue tinge on the addition of starch. (Stromeyer.)—3. Nitrate of silver causes a white precipitate in solutions containing iodine.—4. Chloride of palladium causes a black, flaky precipitate; equal in sensibility to starch. (M. Bauman.)—5. It strikes a blue color with opium and narceine.

Iodine in combination, as it exists in iodic acid and the *iodates*, does not strike a blue color with starch, without the addition of some deoxydizing agent, as sulphurous acid or morphia; and as it exists in the *iodides*, not until the base is saturated with an acid, (as the sulphuric or nitric,) when iodine being set free, immediately reacts upon the starch An excess of either acid or alkali destroys the action of the test. By mixing the liquid containing the iodine with the starch and sulphuric acid, and lightly pouring thereon a small quantity of aqueous chlorine, a very visible blue zone will be developed at the line of contact. (Balard.)

Solutions containing iodates yield, with nitrate of silver, a white precipitate soluble in ammonia; the *iodides*, under the same circumstances, give a pale yellowish precipitate with nitrate of silver, scarcely soluble in ammonia; a *bright yellow* one with acetate of lead; and a *scarlet* one with bichloride of mercury. The *iodates* deflagrate when thrown on burning coals, but the *iodides* do not. The *iodates* may also be tested as iodides, by first heating them to redness, by which they lose their oxygen, and are converted into iodides.

IODINE, CHLORIDES OF. When dry chlorine is passed over dry iodine, at common temperatures, heat is evolved, and a solid chloride results. It is orange-yellow when the iodine is fully saturated, and reddish orange when the iodine is in excess. It deliquesces in the air, is volatile, and very soluble in water, forming a colorless solution, which exhibits acid properties. It is the *chloriodic acid* of Sir H. Davy. The *protochloride of iodine* is formed when chlorine is passed into water holding iodine in suspension, and the *perchloride* by repeatedly distilling the protochloride, or by adding to a solution of the latter a strong solution of corrosive sublimate. The latter is also called the *terchloride*.

IODOSALICULIC ACID. A dark brown fusible mass, obtained by distilling a mixture of iodide of potassium and chloro-saliculic acid; or by dissolving iodine in saliculic acid.

IODO-SULPHURIC ACID. *Prep.* Drop sulphuric acid into a hot concentrated aqueous solution of iodic acid, as long as a precipitate falls. When strongly heated, it sublimes, and is decomposed, but by means of a gentle heat, gradually applied, it melts, and crystallizes in yellow rhomboids as it cools. In a similar manner may be formed *iodo-phosphoric* and *iodonitric acids*. All these act with great energy on the metals, and dissolve gold and platinum.

IODOUS ACID. *Prep.* (Sementini.) Chlorate of potassa and iodine, equal parts; triturate together, until reduced to a homogeneous yellow mass; then heat the mixture over a spirit-lamp, in a glass retort connected with a spacious receiver, until vapors cease to arise. The oily liquid in the receiver is the iodous acid.

II. (Pleischl.) Chlorate of potash 3 parts; iodine 1 part; as last.

Remarks. Iodous acid, or oxide of iodine, reddens test papers, is volatile at 112° F., and freely dissolves iodine. Little is known respecting its precise composition. (See IODIC ACID.)

IODURETED IODIDE OF POTASSIUM. Iodine dissolved in a solution of iodide of potassium. Various strengths are employed by different authorities. (See SOLUTIONS.)

IRIDIUM. (From Iris, *the rainbow*, because of the variety of colors exhibited by its solutions.) A rare metal, discovered by Descotils in 1803, and by Tennant in 1804, in the black powder left in dissolving platina. It is obtained in combination with osmium.

Prep. (Wollaston.) Reduce the pulverulent residue of the ores of platina to fine powder, along with ⅓ of its weight of nitre, and heat the mixture

to redness in a silver crucible, until reduced to a pasty state, and the odor of oxide of osmium becomes perceptible; cool, powder, agitate with the smallest possible quantity of water, place the solution in a retort, acidulate with oil of vitriol diluted with an equal weight of water, and distil rapidly into a clean receiver, as long as fumes of *osmic acid* pass over and condense as a white crust on the sides of the vessel, afterwards liquefying, and sinking beneath the water, forming a flattened globule. By solution in water, agitation with mercury, and the addition of muriatic acid, *osmium* is obtained as a black porous powder, which exhibits a metallic lustre when rubbed. The undissolved portion must now be digested in muriatic acid, and the solution treated with any metal but gold or platinum, when the *iridium* will be precipitated.

Prop., &c. Brittle, pulverulent, and when polished, resembling platinum. It is the heaviest, hardest, most infusible, indestructive, and least affected by acids, of all the metals. With chlorine, iridium forms four compounds:—the *protochloride*, formed by transmitting chlorine over powdered iridium, heated to a dull red, or by digesting the hydrated protoxide in muriatic acid;—the *sesquichloride*, by calcining iridium with nitre, digesting in nitric acid, washing with water, and solution in hydrochloric acid;—the *bichloride*, by digesting the sesquichloride in hot nitro-muriatic acid;—the *terchloride*, obtained as a double chloride of potassium. With oxygen, iridium forms a *protoxide*, *sesquioxide*, and *teroxide*, each of which may be obtained by precipitating a solution of the corresponding chloride with an alkali.

IRIDIO-CHLORIDES. Double salts, formed of the chlorides of iridium with other chlorides. Some of them are crystallizable and soluble.

IRON. *Syn.* FERRUM, (*Lat.*) FER, (*Fr.*) EISEN, (*Ger.*) FERRO, (*It.*) FERRO, (*Port.*) HIERRO, (*Sp.*) JERN, (*Dan. & Swed.*) IJZEN, (*Dut.*) MARS, (*Alch.*) The early history of iron is lost in its antiquity. It is said to have been employed as a medicine upwards of 3200 years ago. As a remedial agent, when properly exhibited, it acts as a genial stimulant and tonic, and generally proves beneficial in cases of chronic debility, unaccompanied with organic congestion or inflammation. For this purpose, the protoxide or its salts should alone be employed, as the peroxide and its salts act, almost universally, as irritant stimulants, occasioning heartburn, febrile symptoms, and accelerated pulse. The powers of the protocarbonate, as it exists in mineral waters, held in solution by carbonic acid in excess, appears to be the form most congenial to the human body; and from its state of dilution, "is rapidly absorbed by the lacteals, and speedily imparts a ruddy hue to the wan countenance." Iron is undoubtedly one of the most valuable articles of the materia medica, and appears, from the antiquity of its introduction into medicine, and the number of its preparations, to have been deservedly appreciated. It bears the recommendation of upwards of 3000 years upon its brow, and surely a medicine that hath withstood such vicissitudes, *cannot* be *destitute* of *virtue*.

Prep. Iron is only prepared on the large scale. In Sweden it is extracted from magnetic iron, and micaceous iron ore; and in England, principally from clay iron ore. It is obtained by smelting the ore along with coke and a flux, (either limestone or clay.) The crude iron thus obtained is run into moulds, and then constitutes CAST IRON OR PIG IRON, (*ferrum fusum.*) By the subsequent process of refining, (puddling, welding,) it is converted into SOFT IRON OR WROUGHT IRON, (*ferrum cusum.*)

Prop. & Uses. The properties and uses of iron are too well known to require description. Its applications in almost every branch of human industry, are almost infinite. It is remarkably ductile, and possesses great tenacity, but it is less malleable than many of the other metals. Its sp. gr. is 7·788. It is the hardest of all of the malleable and ductile metals, and when combined with carbon or silica, (steel,) admits of being tempered to almost any degree of hardness or elasticity. IRON-FILINGS, (*ferri limaturæ,*) IRON-TURNINGS, (*ferri ramenta, ferri scobs,*) and IRON-WIRE, (*ferri filum,*) are the forms under which iron is ordered in the pharmacopœias. The last is only used in preparations, but the others are also taken. *Dose.* Of the filings 5 to 10 grs., in chlorosis, &c. For medical purposes, iron-filings and turnings should be purified by washing, drying, and separating them from particles of copper and other metals, by laying a sieve over them, and drawing them through it with a magnet.

Tests. 1. Metallic iron is attracted by the magnet. 2. It dissolves in muriatic and sulphuric acids, with the evolution of hydrogen gas. 3. Its oxides are also soluble in the acids. 4. The solutions of iron (ferruginous salts) yield a greenish white precipitate, subsequently turning red or brown, when treated with alkalis. 5. Aurochloride of sodium gives a purple precipitate with solutions of the protosalts of iron, and red prussiate of potash a blue one. 6. Prussiate of potash, under like circumstances, gives a pale blue one, or a full blue, if a little nitric acid has been previously added. The protosalts may thus be all converted into persalts, and tested accordingly. 7. The persalts of iron yield a blue precipitate with *yellow* prussiate of potash, but are unaffected by the red prussiate; sulphocyanic and meconic acids strike a red color; gallic acid, tannic acid, and infusion or tincture of galls, a bluish black; succinate and benzoate of ammonia, a yellowish one; citric acid or a citrate, a pale red color, (transparent.) 8. Cochineal freed from fat by ether, and then digested in water, (or very weak spirit,) gives a solution which is colored violet by the protosalts of iron. (Kastner.) 9. Hydrosulphuret of ammonia gives a black precipitate. 10. Phosphate of soda precipitates the persalts white, and the protosalts blue.

IRON, ACETATE OF. ACETATE DE FER, (*Fr.*) ACETATO DI FERRO, (*Ital.*) FERRI ACETAS, (*Lat.*) *Prep.* I. (P. D.) Sesquioxide of iron 1 part; acetic acid 6 parts; digest 3 days and filter. Tonic. *Dose.* 10 to 25 drops in water or wine. This preparation is a mixture of the proto- and per-acetate of iron.

II. (*Pyrolignite of iron. Iron liquor. Dyer's acetate of iron.*) *Prep. a.* (Prof. Runge.) Eight suitable vessels are arranged one above another, like a staircase, so that the top of the upper one may rest over the one immediately below it, and so on of the others to the bottom one. The eight

vessels are now filled with old scraps of iron, and the upper one with pyroligneous acid; after half an hour this is drawn off into the vessel next below it, and this again, after the lapse of another half hour, into the *third*, and so on until the last is emptied. The acid is now passed a second time through the vessels in the same way as before, and thus becomes more strongly impregnated with iron in a less time than by *any other* means, except the following:—

b. (Dr. Winterfield.) This consists in employing several wooden cylinders, resembling those used in the quick process of making vinegar; the space between the two perforated bottoms, usually filled with wood shavings, being occupied with scraps of iron. Pyroligneous acid is then passed through them, and the same system of ventilation observed as in the manufacture of vinegar. (Gewerbe-Blatt f. Sachsen.)

c. Leave old scraps of iron in a cask of vinegar, or pyroligneous acid, and employ occasional agitation, until a sufficiently strong solution is obtained. When the deposite of tar on the iron hinders the solution, it may be burnt off.

d. Add a solution of acetate of lime to another of green copperas, as long as a precipitate is formed; decant.

III. (*Protacetate.*) Dissolve freshly precipitated protoxide or carbonate of iron in acetic acid, or add a solution of acetate of lime to another of protosulphate of iron, and evaporate out of contact with the air. Small green prismatic crystals.

IV. (*Sesquiacetate. Peracetate.*) Dissolve hydrated peroxide of iron in acetic acid, or precipitate a solution of acetate of baryta by another of persulphate of iron. Uncrystallizable.

Remarks. All the above, prepared with crude materials, are used as mordants by the dyers.

IRON, ARSENITE OF. *Prep.* I. (*Protarsenite. Ferri arsenias.*) Precipitate a solution of protosulphate of iron with another of arsenite of soda or ammonia; wash and dry. A yellowish brown powder, used in medicine as a tonic, alterative, and febrifuge.

II. (*Perarsenite. Sesquiarsenite.*) Prepared by precipitating peracetate of iron with arsenite of ammonia, or by boiling nitric acid on the protarsenite.

Remarks. The *arseniates* of the iron may be formed in a similar way, from the arseniate of soda or ammonia.

IRON, ALBUMINATE. *Prep.* I. (Lassaigne.) Precipitate a filtered solution of white of egg with another of persulphate of iron, wash the deposite in water, and dissolve it in alcohol, holding caustic potassa in solution.

II. (Cooley.) Dissolve well washed hydrated protoxide or peroxide of iron in white of egg, diluted with twice its weight of water, and filtered.

Remarks. As a therapeutic agent, the albuminate of iron is highly spoken of by M. Lassaigne and other high authorities, who recommend it as a preparation especially adapted by its nature, on theoretical grounds, for combining with the tissues of the body. It will no doubt, ere long, take a prominent situation among the most esteemed of our chalybeates.

IRON, AMMONIO-CHLORIDE OF. *Syn.* Ferro-chloride of Ammonia. Ammoniated Iron. Ens Veneris Boylei. Ens Martis, (P. L. 1720.) Flores martiales, (P. L. 1775.) Ferrum ammoniacale, (P. L. 1788.) Ferrum ammoniatum, (P. L. 1809 and 1824.) Ferri ammonio-chloridum, (P. L. 1836.) Flores Salis Ammoniaci martialis. Murias Ferri et Ammoniæ. *Prep.* I. (P. L.) Sesquioxide of iron ℥iij; muriatic acid ½ pint; digest in a proper vessel in a sand-bath for 2 hours, then add sal ammonia lb. iiss, dissolved in water 3 pints; filter, evaporate to dryness, and reduce the mass to coarse powder. Orange-colored crystalline grains.

II. Rub sal ammoniac with twice its weight of colcother or rust of iron, sublime with a quick sudden heat, and repeat the sublimation with fresh sal ammoniac as long as the flowers are well colored. Difficult to manage.

Remarks. Ammonio-chloride of iron "is totally soluble in proof spirit and in water. Potassa added to the solution throws down sesquioxide of iron, and when added in excess, evolves ammonia." (P. L.) Tonic. Emmenagogue and aperient. *Dose.* 5 to 15 grs. in glandular swellings, obstructions, &c.

IRON, AMMONIO-TARTRATE OF. *Syn.* Aikin's Ammonio-tartrate of Iron. Tartrate of Iron and Ammonia. Ferro-tartrate of Ammonia. Ammoniæ Ferro-tartras, &c. *Prep.* Tartaric acid 1 part; iron filings 3 parts; digest in a sufficient quantity of hot water to barely cover the mixture for 2 or 3 days, observing to stir it frequently, and to add just enough water to allow the evolved gas to escape freely; then add some liquor of ammonia, and continue the stirring; dilute with water, decant, wash the undissolved portion of iron, filter the mixed liquors, and evaporate to dryness; redissolve in water, add a little more ammonia, filter, and again gently evaporate to dryness, or to the consistence of a thick sirup, when it may be spread upon hot plates of glass, or on earthenware dishes, and dried in a stove-room, as directed for citrate of iron.

Remarks. Glossy, brittle lamellæ, or irregular pieces, deep garnet-colored, almost black, very soluble in water, and possessing a sweetish and slightly ferruginous taste. By repeated re-solution and evaporation its sweetness is increased, probably from the conversion of a part of its acid into sugar. It contains more iron than a given weight of the sulphate of the same base. It is the most pleasant-tasted of all the preparations of iron, except the ammonio-citrate. (Aikin, Lond. Med. Gaz.)

IRON, BENZOATES OF. Prepared by digesting the hydrated oxides in a hot solution of the acid, or from the benzoate of an alkali and a salt of iron by double decomposition.

IRON, BRONZING OF. (See Browning of Gun Barrels, and Bronzing.)

IRON, CARBONATE OF. *Syn.* Ferri Carbonas. This preparation is found in a crystallized state in the mineral called *Spathose iron*, and in some chalybeate waters.

Prep. Precipitate protosulphate of iron by adding a solution of carbonate of soda, well wash the green powder with water and dry it out of contact with the air. On the slightest exposure it is converted into *sesquioxide of iron.*

IRON, CARBONATE, (SACCHARINE.) *Syn.* Klauer's Ferrum carbonicum saccharatum. Ferri Carbonas saccharatum. *Prep.* (P. E.) Sulphate of iron ℥iv; carbonate of soda ℥v; dissolve each separately in water 1 quart, mix the solutions, collect the precipitate, well wash it with cold water, drain on a cloth, squeeze out as much of the water as possible, and add powdered lump sugar ℥ij; mix and dry at a temperature not much above 120° F. The whole operation should be performed as quickly as possible. A sweet-tasted greenish mass or powder, consisting chiefly of carbonate of iron. It is one of the best of the chalybeates. *Dose.* 5 to 10 grs. When pure it should be "easily soluble in muriatic acid with brisk effervescence." (P. E.)

IRON, CHLORIDE OF. *Syn.* Ferri Chloridum. *Prep.* I. (*Protochloride.*) Dissolve iron filings or scales in muriatic acid, evaporate and crystallize. Soluble, green crystals.

II. (*Perchloride. Sesquichloride.*) Dissolve sesquioxide or rust of iron in muriatic acid, evaporate to the consistence of a sirup, and crystallize. Red crystals.

Remarks. Neither of the preceding is absolutely pure; but by transmitting dry hydrochloric acid gas over iron heated to redness, a pure white crystalline protochloride of iron is obtained; and by the combustion of iron wire in chlorine gas, or by passing chlorine over heated iron, the pure perchloride of iron is formed. The *protochloride* is volatile at high temperatures, and the *perchloride* is dissipated by a heat a little above 212° F. The latter is soluble in water, alcohol, and ether, and is deliquescent. (See Tinct. of Sesquichloride of Iron.)

IRON, IODIDES OF. *Prep.* I. (*Protiodide of Iron. Iodide of do. Ioduret of do. Ferri Iodidum*, P. L. *Ferri Ioduretum.*) *a.* (P. L.) Iodine ℥vj; iron filings ℥ij; water 4½ pints; mix, boil in a sand-bath until the liquid turns to a pale green, filter, wash the residue with a little water, and evaporate the mixed liquors in an iron vessel, at 212°, to dryness.

b. (P. E.) The Scotch college orders the solution not to be filtered until evaporated to ⅛, without removing the excess of iron, and then to be filtered as quickly as possible and put into a basin, which must be surrounded with 12 times its weight of quicklime, and placed in some convenient apparatus in which it may be accurately shut in a small space not communicating with the general atmosphere. The whole must then be heated in a hot-air press, in a stove or otherwise, until the water be entirely evaporated, when the iodide of iron must be put into small dry-stoppered vials. *Product excellent.*

Remarks. A great deal has been written and said about the preparation of iodide of iron, much of which is more amusing than instructive. There is in reality very little difficulty in the process. As soon as iodine and iron are mixed together under water, much heat is evolved, and if too much water be not used the combination is soon completed, and the liquor merely requires to be evaporated to dryness, out of contact with the air, at a heat not exceeding 212°. This is most cheaply and easily performed by employing a glass flask, with a thin broad bottom and a narrow mouth, by which means the evolved steam will exclude air from the vessel. I have adopted the following formula with excellent results:—Iodine 18 oz.; iron wire or filings 6 or 7 oz.; water about 1 quart; mix in a glass or stoneware jug, agitate with an iron rod, (cautiously;) when the temperature of the liquid will rise considerably, and the combination be completed in 20 or 30 minutes, without the application of external heat. When the liquor assumes a pale green color, decant it into a glass flask with a thin bottom, wash the remaining iron with a little water, filter, and add it to that already in the flask. Apply the heat of a sand-bath, or a rose gas jet, (preferably the former,) and evaporate to the consistence of a sirup as quickly as possible, then remove the flask into a water-bath containing ⅛ salt and evaporate to dryness, observing not to stir the mass during the latter part of the process. The whole of the uncombined water may be known to be evaporated when vapor ceases to condense on a piece of cold glass held over the mouth of the flask; a piece of moistened starch paper occasionally applied in the same way, will indicate whether free iodine be evolved; should such be the case, the heat should be immediately lessened. When the evaporation is completed, the mouth of the flask should be stopped up by laying a piece of sheet Indian rubber on it, and over that a flat weight; the flask must be then removed, and when cold broken to pieces, the iodide weighed, and put into dry and warm stoppered wide-mouth glass vials, which must be immediately closed, tied over with bladder, and the stoppers dipped into melted wax.

Iodide of iron "evolves violet vapors by heat, and sesquioxide of iron remains. When freshly made it is totally soluble in water, and from this solution when kept in a badly stoppered vessel, sesquioxide of iron is very soon precipitated; but with iron wire immersed in it, it may be kept clear in a well-stoppered vessel." (P. L.) "Entirely soluble in water, or *nearly* so, forming a greenish solution." (P. E.) Its *dilute* solution should be colorless. (A. J. C.)

Dose. 1 to 3 grs. or more. It is tonic, stimulant, and resolvent, and has been given with advantage in debility, scrofula, and various glandular affections.

II. (*Periodide.*) Freely expose a solution of protiodide of iron to the air; or digest iodine in excess on iron under water, gently evaporate, and sublime. A deliquescent, volatile red compound, soluble in water and alcohol.

IRON, LACTATE. *Syn.* Protolactate of Iron. Ferri lactas. *Prep.* I. (Rassman.) Boil iron filings in lactic acid diluted with water till gas ceases to be evolved, filter while hot into a suitable vessel, which must then be closely stopped; as the solution cools, crystals will be deposited, and these must be washed with a little cold water, then with alcohol, and lastly dried. The mother-liquor digested as before with fresh iron will yield more crystals. (Buchner's Rep.)

II. (Pagenstecher.) Lactate of lime prepared from sour milk is dissolved in water, and carbonate of ammonia added till it ceases to produce a precipitate; the liquid is now filtered, and concentrated by heat till it acquires the consistence of a sirup; it is then mixed with 6 times its weight of

rine gas, exhibited by adding 5 or 6 drops of aqueous chlorine to the water (tepid) of the inhaler, which should be of glass. Employed in France for phthisis, but seldom used in England. 4. *Vapor of iodine*, administered as the last, and occasionally used in phthisis. 5. *Oxygen and hydrogen gases*, alone or diluted with air, employed in asthma and phthisis, by means of a bladder and mouth-piece. 6. *Carbonic acid gas and nitrous oxide*, occasionally used as the last in phthisis.

INJECTION. *Syn.* Injectio, (*Lat.*, from *injicio*, to cast into.) Liquid medicines thrown into the cavities of the body by means of a syringe or elastic bag. Those thrown into the rectum are commonly called *clysters*, or *enemata*. (See Enema.) The following are the principal injections employed in medical practice at the present day:—

INJECTION FOR DEAFNESS. *Syn.* Injectio acoustica. *Prep.* I. Ox gall 3 dr.,; balsam of Peru 1 dr.; mix.

II. Oil of almonds or olives 2 oz.; oil of amber 20 drops; tincture of castor 1 dr.; spirit of camphor ½ dr.; laudanum 3 drops; mix.

INJECTION, LITHONTRIPTIC. *Syn.* Inj. lithontriptica. *Prep.* (Chevallier.) Carbonate of soda ʒj; Castile soap ℥ij; water f℥xij; dissolve. For calculus.

INJECTION OF ACETATE OF AMMONIA. *Syn.* Inj. Ammoniæ acetatis. *Prep.* (P. C.) Liquor of acetate of ammonia ℥j; water ℥iij; mix.

INJECTION OF ALUM. *Syn.* Inj. Aluminis. *Prep.* I. (Collier) *a.* Alum 18 grs.; rose-water f℥vj; for the urethra.—*b.* Alum ʒiij; water 1 quart; for the vagina.

II. (Brande.) Compound liquor of alum ʒvj; water f℥viss; mucilage ℥ss.

III. (P. C.) Alum 4 grs.; rose-water ℥iv. All the above are astringent.

INJECTION OF AMMONIA. *Syn.* Inj. Ammoniæ. *Prep.* (Lavagna.) Liquor of ammonia 8 to 12 drops; milk ℥ij; mix. Stimulant and emollient.

INJECTION OF BICHLORIDE OF MERCURY. *Syn.* Inj. Hydrargyri Bichloridi. Inj. Corrosivi Sublimati. *Prep.* I. (P. C.) Corrosive sulimate 8 to 12 grs.; water 1 quart.

II. (P. H.) To the last add wine of opium f℥j.

III. Corrosive sublimate 5 grs.; rose-water 2 oz. Used to promote a healthy action, and to prevent infection.

INJECTION OF CALOMEL. *Syn.* Inj. Calomelanos. *Prep.* (P. C.) Calomel ʒss; quince mucilage ℥iv.

INJECTION OF CHLORINE. *Syn.* Inj. Chlorinata. *Prep.* Liquor of chloride of soda ʒj; water ℥ij. As above.

INJECTION OF COPAIBA. *Syn.* Inj Copaibæ. *Prep.* (P. C.) Balsam of copaiba ʒij; mucilage ℥ss; lime water ℥iv; make an emulsion. Used in diseases of the mucous membranes of the urethra and vagina.

INJECTION OF ACETATE OF COPPER. *Syn.* Inj. Cupri acetatis. *Prep.* (P. C.) Verdigris 10 grs.; oil of almonds ℥iv; triturate until dissolved, then strain.

INJECTION OF ACETATE OF LEAD. *Syn.* Inj. Plumbi acetatis. *Prep.* (Collier) Sugar of lead 40 grs.; rose-water ℥viij.

INJECTION OF AMMONIATED COPPER. *Syn.* Inj. Cupri ammoniati. Inj. Cupri ammonio-sulphatis. *Prep.* I. (P. C.) Liquor of ammonio-sulphate of copper 20 drops; rose-water ℥iv.

II. (Swediaur.) Ammonio-sulphate of copper 5 grs.; rose-water ℥viij.

INJECTION OF SULPHATE OF COPPER. *Syn.* Inj. Cupri sulphatis. *Prep.* Sulphate of copper 5 grs.; roso-water ℥iv.

INJECTION OF SULPHATE OF COPPER, (COMPOUND.) *Prep.* To the last add solution of diacetate of lead 20 drops. The above cupreous injections are all mildly detergent and escharotic.

INJECTION OF CUBEBS. *Syn.* Inj. Cubebæ. *Prep.* Cubebs, in powder, ℥j; extract of belladonna ʒj; boiling water f℥xvj; infuse in a covered vessel, and strain. In diseases of the mucous membranes. Irritant and narcotic.

INJECTION OF LEAD. *Syn.* Inj. Plumbi. *Prep.* Liquor of diacetate of lead ʒss; rose-water ℥j.

INJECTION OF LEAD AND OPIUM. *Syn.* Inj. Plumbi opiata. *Prep.* (Wendt.) Aqueous extract of opium 1½ gr.; mucilage ʒij; solution of diacetate of lead 4 drops; water ℥ij The above are cooling, sedative, and anodyne.

INJECTION OF MERCURY. *Syn.* Inj. Hydrargyri. *Prep.* I. (P. C.) Quicksilver ʒj; gum ℥iss; rub till combined, then add water ℥iss.

II. (E. H.) Quicksilver and balsam of copaiba, of each ʒiv; yolk of 1 egg; rose-water ½ a pint. As last.

INJECTION OF MORPHIA. *Syn.* Inj. Morphiæ. *Prep.* (Brera.) Morphia 2 grs.; oil of almonds ℥j; dissolve. Anodyne and emollient.

INJECTION OF MURIATIC ACID. *Syn.* Inj. Acidi muriatici. *Prep.* (P. C.) Muriatic acid 8 drops; water ℥iv.

INJECTION OF NITRATE OF SILVER. *Syn.* Inj. Argenti nitratis. *Prep.* I. (Collier.) Nitrate of silver 2 grs.; rose-water 1 oz.; dissolve.

II. (Jewell.) Nitrate of silver 12 grs.; distilled water f℥vj. For fistulous sores.

INJECTION OF OIL OF ALMONDS. *Syn.* Inj. Oleosa. *Prep.* (P. C.) Oil of almonds ʒiv; solution of diacetate of lead 8 drops; mix. Emollient and sedative.

INJECTION OF OPIUM. *Syn.* Inj. Opiata. *Prep.* I. (P. C.) Laudanum 40 drops; water ℥iv.

II. (Fr. H.) Wine of opium ʒj; barley water 1 pint. Anodyne.

INJECTION OF TANNIN. *Syn.* Inj. Tannini. Inj. Acidi Tannici. *Prep.* (Richard.) Tannin ℈j; water ℥viij; dissolve. Astringent.

INJECTION OF TEA. *Syn.* Inj. Theæ. *Prep* (P. C.) Green tea ʒj; boiling water ℥viij; infuse. Astringent; frequently used in fluor albus.

INJECTION OF TURPENTINE. *Syn.* Inj. Terebinthinæ. *Prep.* (St. B. H.) Olive oil f℥xij; oil of turpentine f℥iss. Vermifuge.

INJECTION OF WINE. *Syn.* Inj. Vini. *Prep.* (Earle.) Red wine ℥xij; water ℥iv; mix. Astringent; in hydrocele.

INJECTION OF WHITELEAD. *Syn.* Inj. Cerussæ comp. *Prep.* (P. C.) Compound

powder of carbonate of lead ℈j; sulphate of zinc 6 grs.; rose-water ℥iv.

INJECTION OF ACETATE OF ZINC. *Syn.* INJ. ZINCI ACETATIS. *Prep.* Sulphate of zinc ʒj; acetate of lead ℈iv; water 1 pint; mix, and filter.

INJECTION OF SULPHATE OF ZINC. *Syn.* INJ. ZINCI SULPHATIS. *Prep.* (P. C.) Sulphate of zinc 4 to 10 grs.; water f℥iv.

INK. *Syn.* WRITING FLUID. ATRAMENTUM, (*Lat.*) ENCRE, (*Fr.*) TINTE, (*Ger.*) Colored liquid employed for writing with a pen. Ink is made of various substances and colors, of which the following are the principal:—

INK, BLACK. *Prep.* I. Bruised Aleppo nutgalls 12 lbs.; water 6 galls.; boil in a copper vessel for 1 hour, adding water to make up for the portion lost by evaporation; strain and again boil the galls with water 4 gallons, for ½ an hour, strain off the liquor and boil a third time with water 2½ gallons, and strain; mix the several liquors, and while still hot add green copperas, coarsely powdered, 4 lbs.; gum arabic bruised small 3½ lbs.; agitate until dissolved, and after defecation, strain through a hair sieve, and keep it in a bunged-up cask for use. *Product.* 12 gallons, very fine and durable.

II. Campeachy logwood chips 3 lbs.; bruised galls 9 lbs.; boil in water as above, and to the mixed liquors add gum arabic and green copperas, of each 4 lbs.; to produce 16½ galls. of ink. *Quality.* Very good.

III. (Lewis.) Bruised galls, 3 lbs.; gum and sulphate of iron, of each 1 lb.; vinegar 1 gall.; water 2 galls.; macerate with frequent agitation for 14 days. To produce 3 galls. Fine quality.

IV. (M. Ribaucourt.) Bruised galls 1 lb.; logwood, in thin chips, and sulphate of iron, of each ½ lb.; gum 6 oz.; sulphate of copper and sugar candy, of each 1 oz. Boil the galls and logwood in 2½ galls. of water for 1 hour, or until reduced to one half, strain, add the other ingredients, and stir until dissolved, then decant and preserve in stone or glass bottles, well corked. Full colored.

V. (M. Desormeaux, jun.) Logwood chips 4 oz.; water 6 quarts; boil 1 hour and strain 5 quarts; add bruised galls 1 lb.; sulphate of iron calcined to whiteness 4 oz.; brown sugar 3 oz.; gum 6 oz.; acetate of copper ¼ oz.; agitate twice a day for a fortnight, then decant the clear, bottle and cork up for use.

VI. Bruised galls 2 lbs.; logwood, green copperas, and gum, of each 1 lb.; water 6 gallons; boil the whole of the ingredients in the water for 1½ hours, and strain 5 galls. Good, but not fine.

VII. Bruised galls 1 lb.; logwood 2 lbs.; common gum ¾ lb.; green copperas ½ lb.; water 5 gallons; boil. Common, but fit for ordinary purposes.

VII. (*Patent.*) Logwood shavings and powdered galls, of each 2 lbs.; green vitriol 1 lb.; gum ½ lb.; pomegranate bark ¼ lb.; water 1 gallon; infuse 14 days, with frequent agitation.

VIII. (*Asiatic.*) The same as the last. Both write pale, but turn very black by keeping, and flow well from the pen.

IX. (*Used in the Prerogative Office.*). Bruised galls 1 lb.; gum arabic 6 oz.; alum 2 oz.; green vitriol 7 oz.; kino 3 oz.; logwood raspings or sawdust 4 oz.; water 1 gallon; macerate as last. *Said* to write well on parchment.

X. (*Japan.*) This is a black and glossy kind of ink, which may be prepared from either of the above receipts by calcining the copperas until white or yellow, or by sprinkling it (in powder) with a little nitric acid before adding it to the decoction, (preferably the former,) by which the ink is rendered of a full black as soon as made. The glossiness is given by using more gum. Flows less easily from the pen, and is less durable than ink that writes paler and afterwards turns black.

XI. (*Exchequer.*) Bruised galls 40 lbs.; gum 10 lbs.; green sulphate of iron 9 lbs.; soft water 45 gallons; macerate for 3 weeks, employing frequent agitation. "This ink will endure for centuries."

Remarks. The ink prepared by the first formula is the most durable, and will bear dilution with *nearly* its own weight of water, and still be equal to the ordinary ink of the shops. I have writing by me that was executed with this kind of ink upwards of 50 years ago, which still possesses a good color. The respective qualities of the others are noticed at the foot of each.

According to the most accurate experiments on the preparation of black ink, it appears that the quantity of sulphate of iron should not exceed one-third part of that of the galls, by which an excess of coloring matter, which is necessary for the durability of the black, is preserved in the liquid. Gum, by shielding the writing from the action of the air, tends to preserve the color, but if much is employed, the ink flows languidly from *quill* pens, and scarcely at all from *steel* pens. The latter require a very limpid ink. The addition of sugar increases the flowing property of ink, but makes it dry more slowly, and frequently passes into vinegar, when it acts injuriously on the pen. Vinegur, for a like reason, is not calculated for the menstruum.

The addition of a few bruised cloves, or a little oil of cloves; or still better, a few drops of creosote, will effectually prevent any tendency to *mouldiness* in ink. The best *blue* galls should alone be employed in making ink.

Sumach, logwood, and oak bark, are frequently substituted for galls in the preparation of *common* ink. When such is the case, only about one-sixth or one-seventh of their weight of copperas should be employed.

The most permanent (tanno-gallate) inks are those which contain the proper quantity of oxide of iron, at the minimum of oxidizement, in a state of solution or minute suspension, by which means, not only does a larger quantity of the fluid flow from the pen on to a given space, but it also sinks into the substance of the paper, by which the stain is rendered more permanent and less easily removed by attrition. Such inks are uniformly pale until exposed to the air for some days, when they acquire their full color. When the iron is at the maximum of oxidizement, as is the case when calcined copperas is employed, the ink writes of a full black at first, but from its coloring matter being merely a suspended precipitate, it rests upon the surface of the paper without sinking into it, and may consequently be more easily erased than the former. Its black color is also more liable to fade

The very general use of steel pens has caused a corresponding demand for easy flowing inks, many of which have been of late years introduced under the title of "*writing fluids*," or "*steel-pen ink*." These are mostly prepared from galls in the preceding manner, but a less quantity of gum is employed. The blue writing fluids which either maintain their color or turn black by exposure, are prepared from the ferrocyanide of potassium, or from indigo. (See WRITING FLUIDS.)

INKS, BLUE. *Syn.* BLUE WRITING FLUIDS. *Prep.* I. Indigo dissolved in oil of vitriol, and added to water until a proper shade of color is produced, as much potash or soda being also added as the liquid will bear without dropping its color.

II. Powdered Prussian blue 1 oz.; concentrated muriatic acid 1½ to 2 oz.; mix in a matrass or glass bottle, and after 24 or 30 hours, dilute the mass with a sufficient quantity of water.

III. (Mohr.) Pure Prussian blue 6 parts; oxalic acid 1 part; triturate with a little water to *a perfectly smooth* paste, then dilute with a proper quantity of soft water. Both this and the last produce a superb liquid blue, admirably calculated for writing with, when the process is properly managed and the Prussian blue *pure;* but it will not succeed with every sample of that pigment. A little gum may be added, if required, to prevent the fluid spreading on the paper.

INKS, COLORED. Inks of various colors may be made from a strong decoction of the ingredients used in dyeing, mixed with a little alum and gum arabic. Any of the ordinary water-color cakes employed in drawing, diffused through water, may also be used for colored inks.

INK, COPYING. This is prepared by adding a little sugar to ordinary black ink. Writing executed with this ink may be copied within the space of 5 or 6 hours, by passing it through a press in contact with thin unsized paper, when a reversed copy will be obtained, but which will read in proper order by holding the back of the copy towards you. Writing executed with this ink may be copied after any lapse of time, by employing damp copying paper. A warm flat-iron passed over the latter laid upon the writing, may be substituted for the use of the copying press.

INK, GOLD. *Prep.* Honey and gold leaf equal parts; grind together upon a painter's porphyry slab with a muller, until the gold is reduced to the finest possible state of division, and the mass becomes perfectly homogeneous, when it must be agitated with 20 or 30 times its weight of hot water, and then allowed to settle and the water poured off; this process must be repeated with fresh water 2 or 3 times, when the gold must be dried and then mixed up with a little weak gum water for use. The brilliancy of writing performed with this ink is considerable, and may be increased by burnishing. Gold ink may also be made by mixing precipitated gold powder with a little gum water.

INK, GREEN. *Prep.* I. (Klaproth.) Verdigris 2 oz.; cream of tartar 1 oz.; water ½ a pint; boil to one half and filter.

II. Make a strong solution of binacetate of copper in water, or of verdigris in vinegar.

INK, INDELIBLE. *Syn.* MARKING INK. PERMANENT INK. *Prep.* I. Nitrate of silver ½ oz.; hot distilled water ¾ oz.; when cooled a little, add mucilage ½ oz., and sap green or sirup of buckthorn to color; mix well. The linen must be first moistened with "*liquid pounce*," or "*the preparation*," as it is commonly called, dried, and then written on with a clean quill pen. This ink will bear dilution if not wanted very black.

The pounce or preparation. Carbonate of soda 1 oz. to 1½ oz., water 1 pint; color with a little sap green or sirup of buckthorn.

II. (*Without preparation.*) Nitrate of silver 1 to 2 dr.; water ¾ oz.; dissolve, add as much of the strongest ammonia water as will dissolve the precipitate formed on its first addition, then further add mucilage 1 or 2 drachms, and a little sap green to color. Writing executed with this ink turns black on being passed over a hot Italian iron.

III. Terchloride of gold 1½ drachms; water 7 drs.; mucilage 1 dr.; sap green to color; mix. To be written with on a ground prepared with a weak solution of protomuriate of tin, and dried.

Remarks. The products of the first two of the above forms constitute the marking inks of the shops. They have, however, no claim to the title of "indelible ink"—"*which no art can extract without injuring the fabric*"—as is generally represented. On the contrary, they may be discharged with almost as much facility as common iron-moulds. This may be easily and cheaply effected with either chlorine or ammonia, without in the least injuring the texture of the fabric to which it may be applied. From a great number of experiments which I have lately made on the subject, I find that this kind of ink may be discharged from even the finest muslins, without impairing their quality. The only precaution required, is that of rinsing them in clean water immediately after the operation. (See Chem., ii. 210.) The "*marking ink without preparation*," is also more easily extracted than that "*with preparation;*" and the former has also the disadvantage of not keeping so well as the latter, and of depositing a portion of fulminating silver, under some circumstances, which renders its use dangerous. The best marking ink made at the present day is the HERALDIC INK. This ink is either applied with a stamp or pen, and by the former linen may be marked with great facility and neatness.

INK, INCORRODIBLE. *Prep.* I. (Mr Close.) *a.* Powdered copal 25 grs.; oil of lavender 200 grs.; dissolve by a gentle heat, add lampblack 3 grs., indigo 1 gr.—*b.* Powdered copal 1 part; oil of lavender 7 parts; vermilion 4 parts; as last.

II. (Mr. Hausman.) Genuine asphaltum 1 part; oil of turpentine 4 parts; dissolve, and add lampblack or blacklead to bring it to a proper consistence. Resists the action of iodine, chlorine, alkalis, and acids.

III. (Sheldrake.) Asphaltum dissolved in amber varnish and oil of turpentine, and colored with lampblack.

IV. (Cooley.) Asphaltum 1 part; oil of turpentine 4 parts; dissolve, and color with printer's ink. Very permanent.

Remarks. The above are frequently called "*Indelible inks.*" They are employed for writing labels on bottles containing strong acids and alkaline solutions. The second and last are very permanent, and are capable of resisting all the opera-

tions of dyeing and bleaching, and at once offer a cheap and excellent material for marking linen, &c., as they cannot be dissolved off by any menstrua that will not destroy the fabric. They must be employed with stamps or types, which is a neater method than that with a brush or pen.

V. (M. Bezanger.) This patent ink consists of lampblack and caustic soda, mixed with gelatin and caustic soda. It is said to be indelible, and to resemble China ink. (Moniteur Industriel.)

VI. Indian ink, ground up with ordinary black writing ink, forms a cheap indelible ink for common purposes. It will resist the action of chlorine, most acids, and even ablution with a brush or sponge.

INK, INDIAN. *Syn.* China Ink. Indicum. Atramentum Indicum. *Prep.* I. (Proust.) Purify real lampblack by washing it with potash lye, dry, make it into a thick paste with a solution of glue, mould and dry.

II. (M. Merimée.) Dissolve glue in water, add a strong solution of nutgalls, and wash the precipitate in hot water; then dissolve it in a spare solution of glue, filter, evaporate to a proper thickness, and form it into a paste as before, with purified lampblack.

III. (Cooley.) Boil a weak solution of glue at a high temperature in a Papin's digester for 2 hours, then boil it in an *open* vessel for 1 hour more, filter and evaporate to a proper consistence, then make a paste as before with purified lampblack, adding a few drops of essence of musk and about half as much essence of ambergris to perfume; lastly, mould into cakes, and when dry, ornament them with Chinese characters and devices. Quality very superior; does not gelatinize in cold weather like ordinary imitations.

IV. (Gray.) Pure lampblack made up with asses' skin glue, and scented with musk.

V. Seed lac ½ oz.; borax 1 dr.; water ½ pint; boil to 8 oz., filter, and make a paste with pure lampblack as before. Good; when dry it resists the action of water.

Remarks. The Chinese do not use glue in the preparation of their ink, but a glutinous vegetable juice or solution, which at once imparts brilliancy and durability. Starch converted into gum by means of sulphuric acid, or British gum, has been recommended as a substitute, (M. Merimée.) But from information afforded me by a gentleman who has resided some years in China, I am led to believe that the liquid employed by the Chinese to convert their black pigment into a paste, is either an infusion or decoction of some seeds abounding in mucilage, and not the juice of a plant as usually supposed. Indian ink is chiefly employed by artists, but it has been occasionally given as a medicine, dissolved in water or wine, in hemorrhages and stomach complaints. *Dose.* 1 to 2 dr.

INK, MARKING. Ink bottoms. Used by packers for marking bales, boxes, &c.

INK, PERPETUAL. *Prep.* Pitch 3 lbs.; melt over the fire, then add lampblack 1 lb.; mix well. *Used* in a melted state to fill the letters on tombstones, marbles, &c. Without actual violence it will endure as long as the stone itself.

INK, RED. *Prep.* I. Ground Brazil wood 8 oz.; vinegar 10 pints; macerate for 4 or 5 days; boil in a tinned-copper vessel to one half, then add roach alum 8 oz., and gum 3 oz.; dissolve.

II. As the last, but use water or beer instead of vinegar.

III. Stale beer 1 pint; cochineal, bruised, 1 dr.: gum arabic 1 oz.; ground Brazil and alum, of each 2 oz.; boil or macerate with agitation for 14 days, and strain.

IV. Pure carmine 12 grs.; water of ammonia 3 oz.; dissolve, then add powdered gum 18 grs. Half a drachm of powdered drop lake may be substituted for the carmine where expense is an object. Color *superb.* (Buchner's Repert.)

V. Cochineal, in powder, 1 oz.; hot water ½ pint; digest, and when *quite cold,* add spirit of hartshorn ½ pint, or liquor of ammonia 1 oz.; dilute with 3 or 4 oz. of water; macerate for a few days longer, then decant the clear. *Color,* very fine.

INK, SILVER. This is prepared like gold ink.

INKS, SYMPATHETIC. Fluids which, when employed for writing on paper, do not render the marks visible till acted on by some reagent. Sympathetic inks are commonly employed as the instruments of secret correspondence, and frequently escape detection, but by heating the paper before the fire until it is nearly scorched, the whole of them may be rendered visible.

The following are the most common and amusing sympathetic inks:—1. Sulphate of copper and sal ammoniac, equal parts, dissolved in water; writes colorless but turns yellow when heated.—2. Onion juice, like the last.—3. A weak infusion of galls; turns black when moistened with weak copperas water.—4. A weak solution of sulphate of iron; turns blue when moistened with a weak solution of prussiate of potash, and black with infusion of galls.—5. The diluted solutions of nitrate of silver and terchloride of gold; darkens when exposed to the sunlight.—6. Aquafortis, spirits of salts, oil of vitriol, common salt or saltpetre dissolved in a large quantity of water; turns yellow or brown when heated.—7. Solution of nitromuriate of cobalt; turns green when heated, and disappears again on cooling.—8. Solution of acetate of cobalt, to which a little nitre has been added; becomes rose-colored when heated, and disappears on cooling.

INK, YELLOW. *Prep.* I. Boil French berries ½ lb., and alum 1 oz., in water 1 quart, for half an hour or longer, then strain and dissolve in the hot liquor, gum arabic 1 oz.

II. Gamboge in coarse powder 1 oz.; hot water 5 oz.; dissolve, and when cold, add spirit ½ oz. or 1 oz.

INK, TO RESTORE FADED. Writing rendered illegible by age may be restored by moistening it by means of a feather with an infusion of galls, or a solution of prussiate of potash slightly acidulated with muriatic acid, observing so to apply the liquid as to prevent the ink spreading.

INK STAINS may be readily removed from white articles by means of a little salt of lemons, diluted muriatic acid, oxalic acid, or tartaric acid, and hot water; or by means of a little solution of chlorine or chloride of lime. The spots should be afterwards *thoroughly* rinsed in warm water, before touching them with soap. *Marking ink* may be removed by ammonia water, solution of chloride of lime, liquid chlorine, or iodine.

INOCULATION. (In Surgery.) The inser-

tion of poisonous or infectious matter into any part of the body for the purpose of propagating a mild form of disease, and thus preventing or lessening the virulence of future attacks. The word is generally applied to the insertion of the virus of the common smallpox, by which a milder form of the disease is produced, than when it is caught in the natural way. Vaccination has now very generally superseded inoculation.

Oper. Inoculation is performed by inserting the point of a lancet wetted with smallpox matter under the cuticle, and afterwards gently rubbing the moistened point over the scratch.

INULIN. *Syn.* Alantin. Menyanthin. Elecampin. Dahlin. Datiscin. A peculiar starch-like substance first obtained by Rose from the inula helenium or elecampane. It may be obtained by boiling elecampane in 4 times its weight of water, and allowing the decoction to repose for a short time. It is distinguished from starch by the precipitate formed in the cold decoction by an infusion of gall nuts, not disappearing until the liquid is heated to above 212°, while the precipitate from starch redissolves at 122° F. Inulin is soluble in boiling water, but separates as the liquid cools.

IODATE. *Syn.* Iodas, (*Lat.*) A compound formed of iodic acid and a base in definite proportion. The iodates resemble the chlorates of the corresponding bases. They may be easily recognised by the development of free iodine when treated with sulphurous, phosphorous, and hydrochloric acids, and other deoxydizing agents, and by their solutions being converted into iodides when treated with sulphureted hydrogen. They are all of sparing solubility, and many are quite insoluble in water. All the insoluble iodates may be obtained from the iodate of potassa, by decomposing it in solution by a solution of a soluble salt of the base.

IODATE OF MERCURY. *Syn.* Hydrargyri Iodas. *Prep.* Precipitate a solution of mercury in nitric acid with another of iodate of potassa. A yellow powder resembling Turpeth's mineral.

IODATE OF POTASSA. *Syn.* Potassæ Iodas. *Prep.* I. Neutralize a hot solution of potassa with iodine, evaporate to dryness by a gentle heat, powder, and digest in alcohol, to dissolve out the iodide of potassium, then dissolve the residue in hot water and crystallize.

II. (M. Henry, jun.) Iodide of potassium 2 parts; chlorate of potassa 3 do.; fuse the iodide of potassium in a large Hessian crucible; remove it from the fire, and add, while still fluid, successive portions of the powdered chlorate of potassa, stirring well after each addition. When the matter ceases to froth up, cool, powder, and digest in tepid water to dissolve out the chloride of potassium, when the residue may be dissolved in hot water and crystallized.

Remarks. Iodate of potassa has been recommended in bronchocele. A biniodate and teriodate of potassa may also be formed, but possess little interest.

IODATE OF SILVER. *Syn.* Argenti Iodas. *Prep.* From a solution of nitrate of silver, as Iodate of Mercury. A white powder, soluble in ammonia.

IODIC ACID. *Syn.* Oxiodine. Acidum Iodicum. An acid compound of iodine and oxygen discovered by Gay Lussac and Davy.

Prep. I. Dissolve iodate of soda in sulphuric acid in considerable excess, boil for 15 minutes, and set the solution aside to crystallize. *Pure.*

II. (M. Boursen.) Iodine 1 part; *strongest* (monohydrated) nitric acid 4 parts; mix, and apply a gentle heat until the color of the iodine disappears, then evaporate to dryness and leave the residuum in the open air at a temperature of about 15° C. When by attracting moisture it has acquired the consistence of a sirup, put it into a place where the temperature is higher and the air drier, when in a few days very fine white crystals of rhomboidal shape will form. (Compt Rend. xxiv.) *Pure.*

III. (J. L. Lassaigne.) Treat a solution of nitrate of silver with an excess of iodine, filter, evaporate to dryness, and proceed as last. *Pure.*

IV. Diffuse iodine in powder through distilled water, then pass a current of chlorine through the liquid; evaporate.

Remarks. Iodic acid is decomposed into oxygen and iodine by a heat of about 450 to 500° F. It is very soluble in water and deliquescent; it detonates with inflammable bodies like the nitrates and chlorates; with the bases it forms salts called Iodates. The Iodate of soda above alluded to may be made in the same way as the iodate of potassa. Iodic acid is used as a test for morphia and sulphurous acid. (See Iodate.)

IODIDE. *Syn.* Iodure. Ioduret. Hydriodate. Iodidum; Ioduretum; Hydriodas, (*Lat.*) A compound of iodine and a base.

IODIDE OF ARSENIC. *Syn.* Arsenici Iodidum. *Prep.* (Wackenroder.) Sublimed metallic arsenic 1 gr.; pure iodine 6 grs.; water 2 drachms; digest together, evaporate by a gentle heat, and as soon as the mass begins to solidify, the temperature must not exceed 86° F. A red crystalline mass is obtained. (See p. 74.)

IODIDE OF ARSENIC, SOLUTION OF. *Prep.* (Wackenroder.) Dissolve the product of the above process in water 6 oz.; every drachm of which will contain one-forty-eighth gr. of metallic arsenic, and one-tenth gr. (nearly) of iodine.

IODIDE OF CYANOGEN. *Prep.* (Mitscherlich.) Gently heat a mixture of bicyanide of mercury, iodine, and water, in a retort, when iodide of cyanogen will sublime and collect in the neck of the retort, under the form of a crystalline snow or needles. It volatilizes at 100° F., and is soluble in water, ether, and alcohol.

IODIDE OF NITROGEN. *Syn.* Teriodide of Nitrogen. A dark powder, which subsides when iodine is put into liquor of ammonia. It may be more safely and conveniently made by saturating alcohol of sp. gr. ·852 with iodine, adding a large quantity of ammonia, and agitating the mixture; water must now be added, when the iodide will be precipitated, and must be carefully washed with cold distilled water. *** It detonates violently as soon as it becomes dry, and by slight pressure, or friction, even when moist. It should only be prepared in very *small quantities* at a time.

IODIDES OF PHOSPHORUS. *Prep.* I. (*Protiodide.*) Phosphorus 1 part; iodine 7 parts; mix in a close vessel, placed in a freezing mixture

Orange colored; melts at 212°; volatile, and decomposed by water.

II. (*Sesquiodide.*) Phosphorus 1 part; iodine 12 parts; as last. A dark gray semi-crystalline mass, liquid at 84° F.

III. (*Periodide.*) Phosphorus 1 part; iodine 20 parts; as last. A black mass, fusible at about 115° F. All the above yield hydriodic acid and phosphorous or phosphoric acid, by contact with water.

IODIDE OF SULPHUR. *Syn.* SULPHURIS IODIDUM. *Prep.* Iodine 4 parts; sulphur 1 part; place the mixture in a loose-corked flask, immerse it in a water bath, and, as soon as it melts, stir it with a glass rod, then place in the cork, remove the bath from the fire, and let the two cool together. When cold, break the iodide into pieces, and place it in a wide-mouthed stoppered bottle. In this way a beautiful semi-crystalline, dark gray mass, resembling antimony, is obtained.

Remarks. An ointment made with 5 parts of iodide of sulphur, and 96 of lard, or 8 of the iodide and 144 of lard, has been recommended by Biett in tuberculous affections of the skin. Iodide of sulphur stains the skin like iodine, and is readily decomposed by contact with organic substances.

IODIDE OF STARCH. *Syn.* AMYLI IODIDUM. *Prep.* (Dr. Buchanan.) Iodine 24 grs.; water q. s.; triturate; then add starch ℥j; again triturate, until the mass assumes a uniform color. One of the most worthless of the preparations of iodine.

IODIDES, DOUBLE. Several of these compounds have been described by Bonsdorff, Boullay, and Liebig, many of which are formed by dissolving the iodides in a solution of iodide of potassium, when crystals of the double salt are deposited as the liquid cools, or on evaporation. They possess but little interest in a practical point of view.

IODINE: *Syn.* IODE, (*Fr.*) IOD, (*Ger.*) IODIUM; IODINIUM; IODINA, (*Lat.*, from ιωδης, *violet colored*, on account of the color of its vapor.) A chemical element, accidentally discovered in 1812, by De Courtois, a saltpetre manufacturer at Paris, but was first described by Clement, in 1813, and its precise nature was soon afterwards determined by Sir H. Davy and M. Gay Lussac. It is found both in the animal, vegetable, and mineral kingdoms, but exists in greatest abundance in the vegetable family algæ. It is principally manufactured in the neighborhood of Glasgow, from the mother waters of kelp.

Prep. I. Extract all the soluble part of kelp by water, and crystallize the soda by evaporation; to the mother lye add oil of vitriol in excess and boil the liquid, then strain it to separate some sulphur, and mix the filtered liquor with as much manganese as there was oil of vitriol used: on applying heat, the iodine sublimes in the form of grayish black scales, with a metallic lustre. The boiling is conducted in a leaden vessel; and a cylindrical leaden still, with a *very short* head, and connected with 2 or 3 large globular glass receivers, is used for the subliming apparatus. Care must be taken to watch the process, and prevent the neck of the still becoming choked with condensed iodine.

II. (Ure.) Saturate the residual liquor of the manufacture of soap from kelp, of the sp. gr. of 1·374, heated to 230° F., with sulphuric acid diluted with half its weight of water, cool, decant the clear, strain, and to every 12 fluid ounces add 1000 grs. of black oxide of manganese, in powder; put the mixture into a glass globe, or matrass with a wide neck, over which invert another glass globe, and apply heat with a charcoal chauffer; iodine will sublime very copiously, and condense in the upper vessel, which as soon as warm should be replaced by another; and the two globes thus applied in succession, as long as violet vapor arises. It may be washed out of the globes with a little cold water. A thin disc of wood, having a hole in its centre, should be placed over the shoulder of the matrass, to prevent the heat from acting on the globular receiver. On the large scale, a leaden still, as before described, may be employed, and receivers of stoneware economically substituted for glass ones. The addition of the sulphuric acid should be made in a wooden or stoneware basin or trough. *Prod.* 12 oz. yield 80 to 100 grs.

III. (Soubeiran.) Add a mixed solution of 1 part of sulphate of copper and 2¼ parts of protosulphate of iron to the mother liquors of the soda works, as long as a white precipitate is thrown down; the precipitate (diniodide of copper) must be then collected, dried, mixed with its own weight of finely-powdered black oxide of manganese, and distilled by a strong heat in a retort; dry iodine will pass over. By the addition of sulphuric acid with the manganese, a less heat is required.

Remarks. The top of the leaden still employed for the preparation of iodine, is usually furnished with a moveable stopper, by which the process may be watched, and additions of manganese or sulphuric acid made, if required. To render it pure, it should be dried as much as possible, and then resublimed in glass or stoneware.

Prop. Iodine is usually met with under the form of semicrystalline lumps, having a metallic lustre, or in micaceous, friable scales, somewhat resembling gunpowder. It has a grayish-black color, a hot acrid taste, and a disagreeable odor, not much unlike that of chlorine. It fuses at 225° F., volatilizes slowly at ordinary temperatures, boils at 347°, and when mixed with water rapidly rises along with its vapor at 212°. It dissolves in 7000 parts of water, and freely in alcohol and ether. It may be crystallized in large rhomboidal plates, by exposing to the air a solution of it in hydiodic acid. Iodine, like chlorine, has an extensive range of affinity; with the salifiable bases, it forms compounds termed *Iodides, Iodurets,* or *Hydriodates;* and it destroys vegetable colors. Many of the iodides are used in medicine.

Pur. The iodine of commerce is usually that of the first sublimation, and commonly contains 12 to 20% of water. Some of the foreign iodine, obtained by precipitation with chlorine, without subsequent sublimation, frequently contains ¼th water, has a leaden-gray color, and a sensible odor of chlorine. Coal, plumbago, oxide of manganese, crude antimony, and charcoal, are also frequently mixed with it. *Water* may be detected by the loss of weight it suffers when exposed to strong pressure between the folds of bibulous paper,—*chlorine,* by the odor, and the other substances

mentioned above, by digestion in spirits of wine, when the iodine will dissolve, leaving the impurities behind. Before use as a medicine, "it must be dried, by being placed in a shallow basin of earthenware, in a small confined space of air, with 10 or 12 times its weight of fresh-burnt lime, till it scarcely adheres to the side of a dry bottle." Pure iodine "is entirely vaporizable; 39 grs., with 9 grs. of quicklime, and ℥iij of water, when heated short of ebullition, slowly form a perfect solution, which is *yellowish* or *brownish*, if the iodine be *pure*, but colorless, if it contains more than 2% of water, or other impurity." (P. E)

Uses, Dose, &c. Iodine is chiefly used as a medicine, and a chemical test. Its physiological action, when applied externally, is that of an irritant, and, when swallowed in large doses, it produces powerful gastric irritation. In small doses, it appears to be both alterative and tonic, rapidly diffusing itself through the body, and exerting a stimulating action on the organs of secretion. It is also said to be diuretic, and in some cases to have produced diaphoresis and salivation. It exerts a powerful anti-aphrodisiac action, and instances are recorded where absorption of the mammæ and testæ have followed its exhibition. (Hufeland's Journal.) *Dose.* ½ gr. dissolved in spirit, or in water, by means of an equal weight of iodide of potassium. It is seldom exhibited alone, being usually combined with the latter substance, and in fact this salt is now generally preferred by practitioners. Iodine, in medicinal doses, has been exhibited in the following diseases, as well as in most others depending on an imperfect action of the absorbents, or accompanied by induration or enlargement of individual glands or organs:—INTERNALLY, in *bronchocele, goitre; Derbyshire neck, scrofula, ovarian tumors, enlargement or induration of the lymphatic, prostate, and parotid glands, amenorrhœa, leucorrhœa, diseases of the muco-genital tissues, phthisis, chronic nervous diseases, lepra, psoriasis, chronic rheumatism, dropsies, hydrocele, &c.*:—EXTERNALLY, in *scrofula, numerous skin diseases, (especially the scaly,) erysipelas, diseased joints, chilblains, burns, scalds, various wounds, to check ulceration, to promote absorption, &c.* It is applied externally in the form of ointment, solution, or tincture.

Tests. Free iodine may be recognised by—1. The violet color of its vapor.—2. Striking a blue color with starch: this test is so delicate that water containing only $\frac{1}{450000}$ part of iodine, acquires a perceptible blue tinge on the addition of starch. (Stromeyer.)—3. Nitrate of silver causes a white precipitate in solutions containing iodine.—4. Chloride of palladium causes a black, flaky precipitate; equal in sensibility to starch. (M. Bauman.)—5. It strikes a blue color with opium and narceine.

Iodine in combination, as it exists in iodic acid and the *iodates*, does not strike a blue color with starch, without the addition of some deoxydizing agent, as sulphurous acid or morphia; and as it exists in the *iodides*, not until the base is saturated with an acid, (as the sulphuric or nitric,) when iodine being set free, immediately reacts upon the starch. An excess of either acid or alkali destroys the action of the test. By mixing the liquid containing the iodine with the starch and sulphuric acid, and lightly pouring thereon a small quantity of aqueous chlorine, a very visible blue zone will be developed at the line of contact. (Balard.)

Solutions containing iodates yield, with nitrate of silver, a white precipitate soluble in ammonia; the *iodides*, under the same circumstances, give a pale yellowish precipitate with nitrate of silver, scarcely soluble in ammonia; a *bright yellow* one with acetate of lead; and a *scarlet* one with bichloride of mercury. The *iodates* deflagrate when thrown on burning coals, but the *iodides* do not. The *iodates* may also be tested as iodides, by first heating them to redness, by which they lose their oxygen, and are converted into iodides.

IODINE, CHLORIDES OF. When dry chlorine is passed over dry iodine, at common temperatures, heat is evolved, and a solid chloride results. It is orange-yellow when the iodine is fully saturated, and reddish orange when the iodine is in excess. It deliquesces in the air, is volatile, and very soluble in water, forming a colorless solution, which exhibits acid properties. It is the *chloriodic acid* of Sir H. Davy. The *protochloride of iodine* is formed when chlorine is passed into water holding iodine in suspension, and the *perchloride* by repeatedly distilling the protochloride, or by adding to a solution of the latter a strong solution of corrosive sublimate. The latter is also called the *terchloride*.

IODOSALICULIC ACID. A dark brown fusible mass, obtained by distilling a mixture of iodide of potassium and chloro-saliculic acid; or by dissolving iodine in saliculic acid.

IODO-SULPHURIC ACID. *Prep.* Drop sulphuric acid into a hot concentrated aqueous solution of iodic acid, as long as a precipitate falls. When strongly heated, it sublimes, and is decomposed, but by means of a gentle heat, gradually applied, it melts, and crystallizes in yellow rhomboids as it cools. In a similar manner may be formed *iodo-phosphoric* and *iodonitric acids*. All these act with great energy on the metals, and dissolve gold and platinum.

IODOUS ACID. *Prep.* (Sementini.) Chlorate of potassa and iodine, equal parts; triturate together, until reduced to a homogeneous yellow mass; then heat the mixture over a spirit-lamp, in a glass retort connected with a spacious receiver, until vapors cease to arise. The oily liquid in the receiver is the iodous acid.

II. (Pleischl.) Chlorate of potash 3 parts; iodine 1 part; as last.

Remarks. Iodous acid, or oxide of iodine, reddens test papers, is volatile at 112° F., and freely dissolves iodine. Little is known respecting its precise composition. (See IODIC ACID.)

IODURETED IODIDE OF POTASSIUM. Iodine dissolved in a solution of iodide of potassium. Various strengths are employed by different authorities. (See SOLUTIONS.)

IRIDIUM. (From Iris, *the rainbow*, because of the variety of colors exhibited by its solutions.) A rare metal, discovered by Descotils in 1803, and by Tennant in 1804, in the black powder left in dissolving platina. It is obtained in combination with osmium.

Prep. (Wollaston.) Reduce the pulverulent residue of the ores of platina to fine powder, along with ½ of its weight of nitre, and heat the mixture

to redness in a silver crucible, until reduced to a pasty state, and the odor of oxide of osmium becomes perceptible; cool, powder, agitate with the smallest possible quantity of water, place the solution in a retort, acidulate with oil of vitriol diluted with an equal weight of water, and distil rapidly into a clean receiver, as long as fumes of *osmic acid* pass over and condense as a white crust on the sides of the vessel, afterwards liquefying, and sinking beneath the water, forming a flattened globule. By solution in water, agitation with mercury, and the addition of muriatic acid, *osmium* is obtained as a black porous powder, which exhibits a metallic lustre when rubbed. The undissolved portion must now be digested in muriatic acid, and the solution treated with any metal but gold or platinum, when the *iridium* will be precipitated.

Prop., &c. Brittle, pulverulent, and when polished, resembling platinum. It is the heaviest, hardest, most infusible, indestructive, and least affected by acids, of all the metals. With chlorine, iridium forms four compounds:—the *protochloride*, formed by transmitting chlorine over powdered iridium, heated to a dull red, or by digesting the hydrated protoxide in muriatic acid;—the *sesquichloride*, by calcining iridium with nitre, digesting in nitric acid, washing with water, and solution in hydrochloric acid;—the *bichloride*, by digesting the sesquichloride in hot nitro-muriatic acid;—the *terchloride*, obtained as a double chloride of potassium. With oxygen, iridium forms a *protoxide*, *sesquioxide*, and *teroxide*, each of which may be obtained by precipitating a solution of the corresponding chloride with an alkali.

IRIDIO-CHLORIDES. Double salts, formed of the chlorides of iridium with other chlorides. Some of them are crystallizable and soluble.

IRON. *Syn.* Ferrum, (*Lat.*) Fer, (*Fr.*) Eisen, (*Ger.*) Ferro, (*It.*) Ferro, (*Port.*) Hierro, (*Sp.*) Jern, (*Dan. & Swed.*) IJzen, (*Dut.*) Mars, (*Alch.*) The early history of iron is lost in its antiquity. It is said to have been employed as a medicine upwards of 3200 years ago. As a remedial agent, when properly exhibited, it acts as a genial stimulant and tonic, and generally proves beneficial in cases of chronic debility, unaccompanied with organic congestion or inflammation. For this purpose, the protoxide or its salts should alone be employed, as the peroxide and its salts act, almost universally, as irritant stimulants, occasioning heartburn, febrile symptoms, and accelerated pulse. The powers of the protocarbonate, as it exists in mineral waters, held in solution by carbonic acid in excess, appears to be the form most congenial to the human body; and from its state of dilution, "is rapidly absorbed by the lacteals, and speedily imparts a ruddy hue to the wan countenance." Iron is undoubtedly one of the most valuable articles of the materia medica, and appears, from the antiquity of its introduction into medicine, and the number of its preparations, to have been deservedly appreciated. It bears the recommendation of upwards of 3000 years upon its brow, and surely a medicine that hath withstood such vicissitudes, *cannot* be *destitute* of *virtue.*

Prep. Iron is only prepared on the large scale. In Sweden it is extracted from magnetic iron, and micaceous iron ore; and in England, principally from clay iron ore. It is obtained by smelting the ore along with coke and a flux, (either limestone or clay.) The crude iron thus obtained is run into moulds, and then constitutes cast iron or pig iron, (*ferrum fusum.*) By the subsequent process of refining, (puddling, welding,) it is converted into soft iron or wrought iron, (*ferrum cusum.*)

Prop. & Uses. The properties and uses of iron are too well known to require description. Its applications in almost every branch of human industry, are almost infinite. It is remarkably ductile, and possesses great tenacity, but it is less malleable than many of the other metals. Its sp. gr. is 7·788. It is the hardest of all of the malleable and ductile metals, and when combined with carbon or silica, (steel,) admits of being tempered to almost any degree of hardness or elasticity. Iron-filings, (*ferri limaturæ,*) iron-turnings, (*ferri ramenta, ferri scobs,*) and iron-wire, (*ferri filum,*) are the forms under which iron is ordered in the pharmacopœias. The last is only used in preparations, but the others are also taken. *Dose.* Of the filings 5 to 10 grs., in chlorosis, &c. For medical purposes, iron-filings and turnings should be purified by washing, drying, and separating them from particles of copper and other metals, by laying a sieve over them, and drawing them through it with a magnet.

Tests. 1. Metallic iron is attracted by the magnet. 2. It dissolves in muriatic and sulphuric acids, with the evolution of hydrogen gas. 3. Its oxides are also soluble in the acids. 4. The solutions of iron (ferruginous salts) yield a greenish white precipitate, subsequently turning red or brown, when treated with alkalis. 5. Aurochloride of sodium gives a purple precipitate with solutions of the protosalts of iron, and red prussiate of potash a blue one. 6. Prussiate of potash, under like circumstances, gives a pale blue one, or a full blue, if a little nitric acid has been previously added. The protosalts may thus be all converted into persalts, and tested accordingly. 7. The persalts of iron yield a blue precipitate with *yellow* prussiate of potash, but are unaffected by the red prussiate; sulphocyanic and meconic acids strike a red color; gallic acid, tannic acid, and infusion or tincture of galls, a bluish black; succinate and benzoate of ammonia, a yellowish one; citric acid or a citrate, a pale red color, (transparent.) 8. Cochineal freed from fat by ether, and then digested in water, (or very weak spirit,) gives a solution which is colored violet by the protosalts of iron. (Kastner.) 9. Hydrosulphuret of ammonia gives a black precipitate. 10. Phosphate of soda precipitates the persalts white, and the protosalts blue.

IRON, ACETATE OF. Acetate de fer, (*Fr.*) Acetato di Ferro, (*Ital.*) Ferri acetas, (*Lat.*) *Prep.* I. (P. D.) Sesquioxide of iron 1 part; acetic acid 6 parts; digest 3 days and filter. Tonic. *Dose.* 10 to 25 drops in water or wine. This preparation is a mixture of the proto- and per-acetate of iron.

II. (*Pyrolignite of iron. Iron liquor. Dyer's acetate of iron.*) *Prep. a.* (Prof. Runge.) Eight suitable vessels are arranged one above another, like a staircase, so that the top of the upper one may rest over the one immediately below it, and so on of the others to the bottom one. The eight

vessels are now filled with old scraps of iron, and the upper one with pyroligneous acid; after half an hour this is drawn off into the vessel next below it, and this again, after the lapse of another half hour, into the *third*, and so on until the last is emptied. The acid is now passed a second time through the vessels in the same way as before, and thus becomes more strongly impregnated with iron in a less time than by *any other* means, except the following:—

b. (Dr. Winterfield.) This consists in employing several wooden cylinders, resembling those used in the quick process of making vinegar; the space between the two perforated bottoms, usually filled with wood shavings, being occupied with scraps of iron. Pyroligneous acid is then passed through them, and the same system of ventilation observed as in the manufacture of vinegar. (Gewerbe-Blatt f. Sachsen.)

c. Leave old scraps of iron in a cask of vinegar, or pyroligneous acid, and employ occasional agitation, until a sufficiently strong solution is obtained. When the deposite of tar on the iron hinders the solution, it may be burnt off.

d. Add a solution of acetate of lime to another of green copperas, as long as a precipitate is formed; decant.

III. (*Protacetate.*) Dissolve freshly precipitated protoxide or carbonate of iron in acetic acid, or add a solution of acetate of lime to another of protosulphate of iron, and evaporate out of contact with the air. Small green prismatic crystals.

IV. (*Sesquiacetate. Peracetate.*) Dissolve hydrated peroxide of iron in acetic acid, or precipitate a solution of acetate of baryta by another of persulphate of iron. Uncrystallizable.

Remarks. All the above, prepared with crude materials, are used as mordants by the dyers.

IRON, ARSENITE OF. *Prep.* I. (*Protarsenite. Ferri arsenias.*) Precipitate a solution of protosulphate of iron with another of arsenite of soda or ammonia; wash and dry. A yellowish brown powder, used in medicine as a tonic, alterative, and febrifuge.

II. (*Perarsenite. Sesquiarsenite.*) Prepared by precipitating peracetate of iron with arsenite of ammonia, or by boiling nitric acid on the protarsenite.

Remarks. The *arseniates* of the iron may be formed in a similar way, from the arseniate of soda or ammonia.

IRON, ALBUMINATE. *Prep.* I. (Lassaigne.) Precipitate a filtered solution of white of egg with another of persulphate of iron, wash the deposite in water, and dissolve it in alcohol, holding caustic potassa in solution.

II. (Cooley.) Dissolve well washed hydrated protoxide or peroxide of iron in white of egg, diluted with twice its weight of water, and filtered.

Remarks. As a therapeutic agent, the albuminate of iron is highly spoken of by M. Lassaigne and other high authorities, who recommend it as a preparation especially adapted by its nature, on theoretical grounds, for combining with the tissues of the body. It will no doubt, ere long, take a prominent situation among the most esteemed of our chalybeates.

IRON, AMMONIO-CHLORIDE OF. *Syn.* FERRO-CHLORIDE OF AMMONIA. AMMONIATED IRON. ENS VENERIS BOYLEI. ENS MARTIS, (P. L. 1720.) FLORES MARTIALES, (P. L. 1775.) FERRUM AMMONIACALE, (P. L. 1788.) FERRUM AMMONIATUM, (P. L. 1809 and 1824.) FERRI AMMONIO-CHLORIDUM, (P. L. 1836.) FLORES SALIS AMMONIACI MARTIALIS. MURIAS FERRI ET AMMONIÆ. *Prep.* I. (P. L.) Sesquioxide of iron ℥iij; muriatic acid ½ pint; digest in a proper vessel in a sand-bath for 2 hours, then add sal ammonia lb. iiss, dissolved in water 3 pints; filter, evaporate to dryness, and reduce the mass to coarse powder. Orange-colored crystalline grains.

II. Rub sal ammoniac with twice its weight of colcother or rust of iron, sublime with a quick sudden heat, and repeat the sublimation with fresh sal ammoniac as long as the flowers are well colored. Difficult to manage.

Remarks. Ammonio-chloride of iron "is totally soluble in proof spirit and in water. Potassa added to the solution throws down sesquioxide of iron, and when added in excess, evolves ammonia." (P. L.) Tonic. Emmenagogue and aperient. *Dose.* 5 to 15 grs. in glandular swellings, obstructions, &c.

IRON, AMMONIO-TARTRATE OF. *Syn.* AIKIN'S AMMONIO-TARTRATE OF IRON. TARTRATE OF IRON AND AMMONIA. FERRO-TARTRATE OF AMMONIA. AMMONIÆ FERRO-TARTRAS, &c. *Prep.* Tartaric acid 1 part; iron filings 3 parts; digest in a sufficient quantity of hot water to barely cover the mixture for 2 or 3 days, observing to stir it frequently, and to add just enough water to allow the evolved gas to escape freely; then add some liquor of ammonia, and continue the stirring; dilute with water, decant, wash the undissolved portion of iron, filter the mixed liquors, and evaporate to dryness; redissolve in water, add a little more ammonia, filter, and again gently evaporate to dryness, or to the consistence of a thick sirup, when it may be spread upon hot plates of glass, or on earthenware dishes, and dried in a stove-room, as directed for citrate of iron.

Remarks. Glossy, brittle lamellæ, or irregular pieces, deep garnet-colored, almost black, very soluble in water, and possessing a sweetish and slightly ferruginous taste. By repeated re-solution and evaporation its sweetness is increased, probably from the conversion of a part of its acid into sugar. It contains more iron than a given weight of the sulphate of the same base. It is the most pleasant-tasted of all the preparations of iron, except the ammonio-citrate. (Aikin, Lond. Med. Gaz.)

IRON, BENZOATES OF. Prepared by digesting the hydrated oxides in a hot solution of the acid, or from the benzoate of an alkali and a salt of iron by double decomposition.

IRON, BRONZING OF. (See BROWNING OF GUN BARRELS, and BRONZING.)

IRON, CARBONATE OF. *Syn.* FERRI CARBONAS. This preparation is found in a crystallized state in the mineral called *Spathose iron*, and in some chalybeate waters.

Prep. Precipitate protosulphate of iron by adding a solution of carbonate of soda, well wash the green powder with water and dry it out of contact with the air. On the slightest exposure it is converted into *sesquioxide of iron.*

IRON, CARBONATE, (SACCHARINE.) *Syn.* Klauer's Ferrum carbonicum saccharatum. Ferri Carbonas saccharatum. *Prep.* (P. E.) Sulphate of iron ℥iv; carbonate of soda ℥v; dissolve each separately in water 1 quart, mix the solutions, collect the precipitate, well wash it with cold water, drain on a cloth, squeeze out as much of the water as possible, and add powdered lump sugar ℥ij; mix and dry at a temperature not much above 120° F. The whole operation should be performed as quickly as possible. A sweet-tasted greenish mass or powder, consisting chiefly of carbonate of iron. It is one of the best of the chalybeates. *Dose.* 5 to 10 grs. When pure it should be "easily soluble in muriatic acid with brisk effervescence." (P. E.)

IRON, CHLORIDE OF. *Syn.* Ferri Chloridum. *Prep.* I. (*Protochloride.*) Dissolve iron filings or scales in muriatic acid, evaporate and crystallize. Soluble, green crystals.

II. (*Perchloride. Sesquichloride.*) Dissolve sesquioxide or rust of iron in muriatic acid, evaporate to the consistence of a sirup, and crystallize. Red crystals.

Remarks. Neither of the preceding is absolutely pure; but by transmitting dry hydrochloric acid gas over iron heated to redness, a pure white crystalline protochloride of iron is obtained; and by the combustion of iron wire in chlorine gas, or by passing chlorine over heated iron, the pure perchloride of iron is formed. The *protochloride* is volatile at high temperatures, and the *perchloride* is dissipated by a heat a little above 212° F. The latter is soluble in water, alcohol, and ether, and is deliquescent. (See Tinct. of Sesquichloride of Iron.)

IRON, IODIDES OF. *Prep.* I. (*Protiodide of Iron. Iodide of do. Ioduret of do. Ferri Iodidum*, P. L. *Ferri Ioduretum.*) *a.* (P. L.) Iodine ℥vj; iron filings ℥ij; water 4½ pints; mix, boil in a sand-bath until the liquid turns to a pale green, filter, wash the residue with a little water, and evaporate the mixed liquors in an iron vessel, at 212°, to dryness.

b. (P. E.) The Scotch college orders the solution not to be filtered until evaporated to ⅓, without removing the excess of iron, and then to be filtered as quickly as possible and put into a basin, which must be surrounded with 12 times its weight of quicklime, and placed in some convenient apparatus in which it may be accurately shut in a small space not communicating with the general atmosphere. The whole must then be heated in a hot-air press, in a stove or otherwise, until the water be entirely evaporated, when the iodide of iron must be put into small dry-stoppered vials. *Product excellent.*

Remarks. A great deal has been written and said about the preparation of iodide of iron, much of which is more amusing than instructive. There is in reality very little difficulty in the process. As soon as iodine and iron are mixed together under water, much heat is evolved, and if too much water be not used the combination is soon completed, and the liquor merely requires to be evaporated to dryness, out of contact with the air, at a heat not exceeding 212°. This is most cheaply and easily performed by employing a glass flask, with a thin broad bottom and a narrow mouth, by which means the evolved steam will exclude air from the vessel. I have adopted the following formula with excellent results:—Iodine 18 oz.; iron wire or filings 6 or 7 oz.; water about 1 quart; mix in a glass or stoneware jug, agitate with an iron rod, (cautiously;) when the temperature of the liquid will rise considerably, and the combination be completed in 20 or 30 minutes, without the application of external heat. When the liquor assumes a pale green color, decant it into a glass flask with a thin bottom, wash the remaining iron with a little water, filter, and add it to that already in the flask. Apply the heat of a sand-bath, or a rose gas jet, (preferably the former,) and evaporate to the consistence of a sirup as quickly as possible, then remove the flask into a water-bath containing ⅕ salt and evaporate to dryness, observing not to stir the mass during the latter part of the process. The whole of the uncombined water may be known to be evaporated when vapor ceases to condense on a piece of cold glass held over the mouth of the flask; a piece of moistened starch paper occasionally applied in the same way, will indicate whether free iodine be evolved; should such be the case, the heat should be immediately lessened. When the evaporation is completed, the mouth of the flask should be stopped up by laying a piece of sheet Indian rubber on it, and over that a flat weight; the flask must be then removed, and when cold broken to pieces, the iodide weighed, and put into dry and warm stoppered wide-mouth glass vials, which must be immediately closed, tied over with bladder, and the stoppers dipped into melted wax.

Iodide of iron "evolves violet vapors by heat, and sesquioxide of iron remains. When freshly made it is totally soluble in water, and from this solution when kept in a badly stoppered vessel, sesquioxide of iron is very soon precipitated; but with iron wire immersed in it, it may be kept clear in a well-stoppered vessel." (P. L.) "Entirely soluble in water, or *nearly* so, forming a greenish solution." (P. E.) Its *dilute* solution should be colorless. (A. J. C.)

Dose. 1 to 3 grs. or more. It is tonic, stimulant, and resolvent, and has been given with advantage in debility, scrofula, and various glandular affections.

II. (*Periodide.*) Freely expose a solution of protiodide of iron to the air; or digest iodine in excess on iron under water, gently evaporate, and sublime. A deliquescent, volatile red compound, soluble in water and alcohol.

IRON, LACTATE. *Syn.* Protolactate of Iron. Ferri lactas. *Prep.* I. (Rassman.) Boil iron filings in lactic acid diluted with water till gas ceases to be evolved, filter while hot into a suitable vessel, which must then be closely stopped; as the solution cools, crystals will be deposited, and these must be washed with a little cold water, then with alcohol, and lastly dried. The mother-liquor digested as before with fresh iron will yield more crystals. (Buchner's Rep.)

II. (Pagenstecher.) Lactate of lime prepared from sour milk is dissolved in water, and carbonate of ammonia added till it ceases to produce a precipitate; the liquid is now filtered, and concentrated by heat till it acquires the consistence of a sirup; it is then mixed with 6 times its weight of

alcohol of sp. gr. ·879, and a concentrated solution of protochloride of iron added, containing a quantity of the salt equal to 38⅝ of the lactate of lime employed. In about 36 hours the mixed liquid will have deposited all its lactate of iron in minute crystals, which may be obtained by straining and pressure between the folds of bibulous paper. It is a mild chalybeate, nearly insoluble in cold water.

IRON, OXIDES OF. *Prep.* I. (*Protoxide.*) This oxide is precipitated from solutions of the protosalts of iron, as a white hydrate by pure alkalis, and as a white carbonate by the alkaline carbonates; both of which turn first green and then red by exposure to the air. It readily dissolves in the acids forming protosalts of iron.

II. (*Sesquioxide. Peroxide. Red oxide.*)—1. By precipitation. (*Carbonate of iron. Subcarbonate of do. Precipitated carbonate of do. Ferri sesquioxidum,* P. L. *Ferri oxydum rubrum,* P. E. *Ferri carbonas,* P. D. *Oxyde de Fer rouge; Carbonate de Fer,* Fr. *Kohlensaures eisen Rost,* Ger.) By precipitating a solution of sulphate of iron with another of carbonate of soda, washing thoroughly the precipitate with water, and drying it. The *London College* orders of sulphate of iron lb. iv; carbonate of soda lb. iv ℥ij; boiling water 6 gallons;—the *Edinburgh,* sulphate of iron ℥iv; carbonate of soda ℥v; water 4 pints;—the *Dublin,* sulphate of iron 25 parts; carbonate of soda 26 parts; water 800 parts. A greenish brown powder, reddening by exposure to air and to heat.

2. By calcination. (*Crocus. Crocus martis. Colcothar. Trip. Brown red. Indian red. Rouge. Jewellers' do. Caput mortuum vitrioli. Crocus martis astringens. Do. do. sulphuratus. Portée d'acier. Terra dulcis vitrioli. Ferrum oxydum rubrum,* P. D. *Rouge d'Angleterre; Oxyde de Fer rouge,* Fr. *Rothes eisenoxyd,* Ger.)

a. (P. D.) Calcine sulphate of iron, then roast it with a strong fire until acid vapors cease to rise, cool, wash with water till the latter ceases to affect litmus, and dry.

b. (Berzelius.) Green sulphate of iron 100 parts; common salt 42 parts; calcine, wash well with water, dry, and levigate the residuum. This process yields a cheap and beautiful product, which is frequently sold for the sesquioxide, P. L., but is less soluble.

3. From metallic iron. (*Rust of iron. Crude carbonate, or hydrated sesquioxide of iron. Ferri rubigo,* P. D.) Moisten iron wire cut into pieces with water, and expose it to the air until corroded into rust, then grind, elutriate, and dry. Iron filings may be used for wire. It is usually made up into small conical loaves.

Remarks. Sesquioxide of iron, prepared by precipitation, is an impalpable powder, of a brownish red color, odorless, insoluble in water, and possessing a slightly styptic taste, especially when recently prepared. When exposed to heat, its color is brightened, its sp. gr. increased, and it is rendered less easily soluble in acids. The sesquioxide prepared by calcination is darker and brighter colored, less soluble, and quite tasteless. It has either a scarlet or purplish cast, according to the heat to which it has been exposed. The finest *Indian red* or *crocus* usually undergoes a second calcination, in which it is exposed to a very intense heat. The best *jewellers' rouge* is prepared by calcining the precipitated oxide until it becomes scarlet. The rust of iron contains some combined water, and is more soluble than the oxide prepared by calcination.

Uses, &c. The precipitated oxide is employed in medicine as a tonic and emmenagogue in doses of 10 to 30 grs.; and in tic douloureux, in doses of ʒj to ʒiv, mixed up with honey. It is also employed to make some preparations of iron. *Rust of iron* is likewise used in the same way. The *calcined* oxide is employed as a pigment, as an ingredient in a plaster, &c.

III. (*Black oxide. Magnetic oxide. Martial Ethiops. Æthiops martialis. Ferri oxidum nigrum,* P. E. *Oxydum ferroso-ferricum,* Berzelius. *L'Oxide noir de fer,* Fr. *Schwarzesges auertes eisen,* Ger.) *Prep.* I. (P. E.) Sulphate of iron ℥vj; oil of vitriol fʒij f℈ij; nitric acid fʒiv; liquor of ammonia (fort.) f℥ivss; boiling water 3 pints; dissolve half the sulphate in half of the water, add the oil of vitriol, boil, add the nitric acid gradually, boiling after each addition for a few minutes; dissolve the remaining half of the sulphate of iron in the rest of the boiling water; mix the two solutions and add the ammonia, stirring well all the time; collect the precipitate on a calico filter, wash with water till the latter ceases to affect nitrate of baryta water, and dry at a heat not exceeding 180° F. The formulæ of Gregory and Dr. Jephson are similar.

II. The Dublin College orders it to be prepared by washing the black scales of iron (Ferri oxydi squamæ) that fall around the smith's anvils, drying, detaching them from impurities by means of a magnet, then grinding, elutriating, and drying. This process is the cheaper of the two, but the product is inferior as a medicine, being less easily soluble.

Remarks. When pure it is attracted by the magnet, and entirely soluble in muriatic acid; and ammonia added to the solution throws down a black precipitate, (P. E.) *Dose.* 5 to 20 grains two or three times a day.

IV. *Hydrated peroxide. Do. Sesquioxide. Ferrugo,* P. E. *Hydrate de peroxide de Fer,* Fr. *Eisen oxydhydrat,* Ger. *Prep.* (P. E.) Sulphate of iron ℥iv; oil of vitriol f℥iiiss; water 1 quart; mix, dissolve, and boil, then gradually add nitric acid fʒix; stirring well and boiling for a minute or two after each addition, until the liquor yields a yellowish-brown precipitate with ammonia, when it must be filtered and precipitated with liquor of ammonia (fort.) ℥iiiss, rapidly added and well mixed in; collect, wash well with water, drain on a calico filter, and dry at a heat not exceeding 180° F.; when intended as an antidote for arsenic it should not be dried, but kept in the moist or gelatinous state.

Remarks. Very soluble in acids. As an antidote for arsenic 1 tablespoonful of the moist oxide may be given every 5 or 10 minutes, or as often as the patient can swallow it. (Pereira.) When this preparation cannot be obtained, *rust of iron,* or even the dry *carbonate,* (sesquioxide,) may be given along with water instead. 12 parts of the hydrated oxide of iron are required to neutralize 1 part of arsenious acid. (Dr. Maclagan.) We are indebted to Messrs. Bunsen and Berthold for the

introduction of this substance as an antidote to arsenic. *Dose*. As a tonic, 5 to 20 grs. The *rust of iron* is also a hydrated oxide, but is less soluble than that recently precipitated from its solution in an acid.

IRON, PERNITRATE. *Syn*. FERRI PERNITRAS. FERRI PERSESQUINITRAS. *Prep*. Digest iron in nitric acid diluted with water, until saturated. It has been given in diarrhœa.

IRON, PERSULPHATE. *Syn*. TRITOSULFATE DE FER. PERSESQUI-SULPHATE OF IRON. FERRI PERSULPHAS. *Prep*. The liquor, before the addition of the ammonia in the last article but one, is a solution of *persulphate of iron*, which may be evaporated. This salt is also formed when protosulphate of iron is calcined with free exposure to the air. Dissolved in water it is used as a test for prussic, gallic, tannic, and boletic acids.

IRON, PHOSPHATE. *Syn*. FERRI PHOSPHAS. *Prep*. Precipitate a solution of sulphate of iron by another of phosphate of soda; wash and dry. A blue powder, frequently called the PROTO-PHOSPHATE of iron. The PERPHOSPHATE OF IRON, (*Sesqui-phosphate of iron, Oxyphosphate of iron, Ferri phosphas tritoxydi, Ferri sesquiphosphas*,) is a white powder, obtained by precipitating sesquichloride of iron by phosphate of soda. Both the above are given in scrofula and cancer. *Dose*, 10 to 15 grs.

IRON, POTASSIO-TARTRATE OF. *Syn*. TARTRATE OF POTASH AND IRON. TARTRATE OF IRON. FERRO-TARTRATE OF POTASSA. CREMOTARTRATE OF IRON. FERRI POTASSIO-TARTRAS, (P. L.) FERRUM TARTARIZATUM, (P. E.) FERRI TARTARUM, (P. D.) TARTRATE DE FER ET DE POTASSE, (*Fr*.) EISENWEINSTEIN, (*Ger*.) *Prep*. I. (P. L.) Boil freshly precipitated sesquioxide of iron with a solution of cream of tartar, till it ceases to be dissolved; then filter, and if the liquor reddens litmus paper, add a solution of sesquicarbonate of ammonia to saturation; again strain, and evaporate to dryness.

II. (P. D.) Iron wire (filings) 1 part; bitartrate of potash, in fine powder, 4 parts; distilled water 8 parts, or q. s.; mix, expose the mass to the air in a shallow vessel for 15 days, occasionally stirring, and adding enough water to keep the mass moist; lastly, boil the magma in water, filter, and evaporate.

Remarks. This preparation is a double salt of iron and potassa; it is therefore wrongly called *tartrate* of iron. It should be "totally soluble in water, neutral to litmus, unaffected by yellow prussiate of potash, and not precipitated by acids nor alkalis, nor acted on by the magnet." (P. L.) "Entirely soluble in *cold* water; taste, feebly chalybeate." (P. E.) An excellent ferruginous tonic. *Dose*. 10 to 30 grs. made into a bolus with aromatics.

IRON, SULPHATE OF. *Syn*. COPPERAS. GREEN VITRIOL. PROTOSULPHATE OF IRON. VITRIOL OF MARS. SALT OF MARS. VITRIOLATED IRON. VITRIOLUM VIRIDE. VITRIOLUM MARTIS. SAL MARTIS. FERRUM VITRIOLATUM. VITRIOLUM VULGARE ANGLICANUM. VITRIOLUM FERRI. VITRIOLUM FERRATUM. FERRI SULPHAS, (P. L. E. and D.) COUPEROSE VERTE; SULPHATE DE FER, (*Fr*.) SCHWEFELSAURES EISEN-OXYDUL, EISEN VITRIOL, (*Ger*.) CHALCANTHUM, (Pliny.)

Prep. (*Ferri sulphas*, P. L., *medicinal sulphate of iron*.) Iron filings ℥viij; sulphuric acid ℥xiv; water 4 pints; dissolve by heat, filter, set aside to crystallize, and evaporate for more crystals. The Dublin College orders iron wire to be employed, and the Edinburgh College directs the transparent green crystals of the copperas of commerce, to be dissolved in their own weight of boiling water, acidulated with sulphuric acid, and recrystallized.

Remarks. It should be perfectly soluble in water, and a piece of iron put into the solution should not precipitate metallic copper. (P. L.) Sulphate of iron prepared by dissolving iron wire or filings in the acid, should alone be used in medicine. It is very astringent. *Dose*. From ½ gr. to 5 grs., in pills or solution. Commercial sulphate of iron (copperas) is used in dyeing, and for various other purposes in the arts. (See COPPERAS.)

IRON, SULPHATE OF, (DRIED.) *Syn*. FERRI SULPHAS EXSICCATUM, (P. E.) *Prep*. See COPPERAS, CALCINED, p. 219. It is used to make pills. 5 parts of the crystallized sulphate lose very nearly 2 parts by drying.

IRON, SULPHURET OF. *Syn*. CHALYBS CUM SULPHURE. SULPHURETUM FERRI, (P. E. and D.) *Prep*. Expose a bar of iron to a *full* white heat, and instantly apply a solid mass of sulphur to it, observing to let the melted product fall into water; separate the sulphuret from the sulphur, dry, and preserve it in closed vessels. (P. E. & D.) It may also be made for pharmaceutical purposes, by heating a mixture of 1 part of sublimed sulphur and 3 parts of iron filings in a common fire, till the mixture begins to glow, and then removing the crucible and covering it, until the action shall come to an end. (P. E.)

Remarks. Several other sulphurets of iron are prepared by chemists. The TETRASULPHURET is made by transmitting hydrogen gas over dry disulphate of peroxide of iron;—the *disulphuret* by a like treatment of the dry protosulphate of iron. (Arfwedson.)—The PROTOSULPHURET OF IRON is made by heating 28 parts of iron filings with 16 parts of sulphur in a crucible, in the way above described; or by precipitating a solution of protosulphate of iron by hydrosulphate of ammonia.—The SESQUISULPHURET is made by dropping a solution of perchloride of iron into another of hydrosulphate of ammonia, when this compound falls as a black precipitate.—The BISULPHURET OF IRON (*iron pyrites*) is found in large quantities in the mineral kingdom.—*Magnetic iron pyrites* is a mixed sulphuret of iron found in nature. All the compounds of iron and sulphur, except the *bisulphuret*, yield sulphureted hydrogen, when treated with sulphuric or muriatic acid; hence their frequent employment in chemistry for that purpose. Equal parts of sulphur and iron filings melted together in a covered crucible, form a compound frequently used for copying medals, &c. It melts easily, and takes sharp casts, and may be colored red with vermilion. Native iron pyrites is also called BRASS-BALLS, HORSE GOLD, COPPERAS-BALLS, PYRITES FERRI, &c.

ISATIC ACID. Prepared from isatine by solution in caustic potassa, the application of heat till the purple color passes into yellow, evaporation, and crystallization. The ISATATE OF POTASSA thus obtained is then dissolved in alcohol, recrystallized,

the crystals dissolved in water, the solution precipitated with acetate of lead, and the white powder (ISATATE OF LEAD) diffused through water, and sulphureted hydrogen passed through the liquid, when a solution of isatic acid is obtained, which by spontaneous evaporation yields a white semi-crystalline powder. Isatic acid is soluble in cold water, but is decomposed when the solution is heated. It forms salts with the bases called ISATATES.

ISATINE. A product of the oxidation of indigo, discovered by Erdman and Laurent. It is obtained by heating finely-powdered indigo with a mixture of equal parts of sulphuric acid and bichromate of potash in 25 parts of water; a deep brown liquid is formed, which, on cooling, deposites crystals of isatine. These are purified by recrystallization, first, in water, and then in alcohol. It forms lustrous orange red crystals, soluble in water and alcohol. Alkalis convert it into *isatic acid*, and chlorine into CHLORISATINE and BICHLORISATINE.

ISATYDE. This name has been given by Erdman to a yellowish powder obtained by dissolving isatine in hydrosulphuret of ammonia: it is deposited as the liquor cools.

ISETHIONIC ACID, AND ETHIONIC ACID. Two new acids obtained by Magnus, by treating alcohol with a hydrous sulphuric acid in the cold, diluting with water, neutralizing with carbonate of baryta, filtering, evaporating to a sirup, adding alcohol, and cautiously decomposing the whole precipitate (ethionate of baryta) with sulphuric acid, when a solution of *ethionic* acid is formed; when this solution is boiled, it is converted into *sulphuric acid* and *isethionic acid*. The latter acid may also be formed by saturating pure ether with dry sulphuric acid, adding water, separating the stratum below the ether, neutralizing with baryta, evaporating (below 212°) till crystals begin to appear, adding absolute alcohol, dissolving in water, again precipitating by alcohol, dissolving a third time in water, and then precipitating the baryta with sulphuric acid. The first acid forms salts termed ISETHIONATES with the bases; the latter ETHIONATES. By cautious evaporation, isethionic acid forms a viscid oily liquid.

ITACONIC ACID. Pyrocitric acid, obtained by the action of heat on aconitic acid.

ITCH. *Syn.* SCABIES, PSORA, (*Lat.*) GALE, (*Fr.*) There are four varieties of itch, distinguished by nosologists by the names *scabies papuliformis*, or rank itch; *scabies lymphatica*, or watery itch; *scabies purulenta*, or pocky itch; *scabies cachectica*, a species exhibiting appearances resembling each of the previous varieties. Our space will not permit more than a general notice of the common symptoms, and the mode of cure which is equally applicable to each species, and will not prove injurious to other skin-diseases simulating the itch.

The common itch consists of an eruption of minute vesicles, principally between the fingers, bend of the wrist, &c., accompanied by intense itching of the parts, which is only aggravated by scratching. It is most readily cured by the repeated application of *sulphur ointment*, (simple or compound,) which should be well rubbed in, once or twice a day, until a cure is effected; accompanying its use by the internal exhibition of a spoonful or more of flowers of sulphur, mixed with treacle or milk, night and morning. Where the external use of sulphur is objectionable, on account of its smell, a lotion or bath of sulphuret of potassium, or of chloride of lime, may be employed instead. (See BATHS, LOTIONS, and OINTMENTS.)

JAGGERIES. 1. *Cocoa jaggery;* Ténné vellum.) Raw sugar made from cocoanut toddy by evaporation.—2. *Palmyra jaggery,* (Pannay vellum,) from Palmyra toddy, as last; 6 pints yield 1 lb.—3. *Malabar jaggery,* (Koondee panei vellum,) from Malabar toddy.—4. *Mysore jaggery,* from Mysore toddy; 17 gallons yield 46 lbs. All are used as raw sugar.

JALAP. The jalap ipomæa (*ipomæa purga vel jalapa*) contains the following substances, which have been proposed as remedies:—

JALAPIC ACID. *Prep.* Add an alcoholic solution of acetate of lead to a similar solution of jalap resin, collect the precipitate, and throw down the lead by means of sulphureted hydrogen. Soluble in alcohol and alkalis, and slightly so in ether. Jalap root contains 13§ of jalapic acid.

JALAPIN. *Syn.* JALAPINA. *Prep.* I. Add an alcoholic solution of acetate of lead to an alcoholic solution of jalap resin as long as a precipitate (*jalapate of lead*) is formed; filter; the liquid is a solution of *acetate of jalapine*, which, after the removal of the acetic acid and excess of lead, and evaporation to dryness, yields jalapin. A transparent, colorless resin, very soluble in alcohol. Purgative.

II. (Hume.) Digest coarsely-powdered jalap in strong acetic acid for 14 days, add ammonia in excess, agitate strongly, filter, wash the deposite in cold water, redissolve in acetic acid, reprecipitate by ammonia, wash, and dry.

JALAP RESIN. *Prep.* I. (M. Planche.) Digest bruised or coarsely-powdered jalap in alcohol or rectified spirit of wine for some days, then express the tincture, add water, wash the precipitated resin with warm water, dry in a water-bath, dissolve the resin in alcohol, add a little animal charcoal, agitate, filter, and evaporate to dryness.

II. (M. A. Nativelle.) Digest jalap root in boiling water for 24 hours, then reduce it to thin slices, add more water, and boil for 10 minutes, agitating the mixture occasionally; express the liquid in a tincture press, and repeat the boiling and pressing a second and a third time. These decoctions by evaporation yield aqueous extract of jalap. The pressed root is now placed in an alembic, and alcohol at 65° C. added, the whole boiled for 10 minutes, and then allowed to cool; the tincture is next pressed out, and the boiling with fresh alcohol and expression is repeated twice; a little animal charcoal is then added to the mixed tinctures, and, after thorough agitation, the latter are filtered; the spirit is then distilled until nothing passes over, the supernatant liquor is next poured off the fluid resin, and the latter dried by spreading it over the surface of the capsule, and continuing the heat. The product is a friable and nearly colorless resin, which forms a white powder resembling starch. 1 kilogramme of jalap root yields 100 grammes of pure resin.

*** Earthenware, or well-tinned copper vessels must alone be used in the above process, as contact with copper or iron turns the resin black and

this tinge can only be removed by re-solution in alcohol, the addition of animal charcoal, and re-evaporation.

Remarks. Jalap resin is soluble in alcohol. It is a JALAPATE OF JALAPIN (Buchner and Herberger.) The jalap resin of commerce is generally adulterated with scammony, gum guaiacum, or rosin. When in a state of purity, it does not form an emulsion with milk, but runs into a solid mass, which is not the case with scammony resin. It is also insoluble in fixed oils and turpentine; whereas the common resins are freely soluble in those menstrua. Its alcoholic solution dropped on a piece of absorbent white paper, and exposed to the action of nitrous gas, does not acquire a green or blue color; if it does, guaiacum resin is present. 2§ of this adulteration may be thus detected. (M. Gobley.) Jalap resin is insoluble in ether; but guaiacum resin, common resin, and some others are so; the decanted ether should not become opalescent when mixed with water, and should evaporate without leaving any residuum. Powdered jalap resin placed in cold water does not dissolve, but forms a semi-fluid, transparent mass, as if it had been melted; this characteristic distinguishes it from other resins. An energetic cathartic. *Dose.* 1 to 5 grs.

JALAP RESIN, (FACTITIOUS.) A substance frequently sold for jalap resin is made by fusing a mixture of pale yellow rosin (*white rosin*) and scammony resin, and adding, when cooled a little, but still semi-fluid, a few drops of balsam of Peru or tolu; the mixture is then poured into small paper capsules or tin moulds. Its effects resemble those of jalap resin, but it inflames less. (X. Landerer.)

JAMAICINE. *Syn.* JAMACINA. A peculiar alkaloid obtained by Huttenschmidt from cabbage-bark, (*cortex ardiræ inermis.*) It is a brownish yellow, crystalline substance; soluble in water and alcohol; fusible, and very bitter tasted. It forms salts with the acids, which, in small doses, produce restlessness and trembling; and in larger ones, purging. It is said to be vermifuge.

JAMS. (In CONFECTIONARY.) Conserves of fruit and sugar. They are all made by boiling either the pulped or bruised fruit over the fire along with ½ its weight to an equal weight of loaf sugar, until the mixture jellies, when a little is placed on a *cold* plate. When sufficiently thick, the semi-fluid mass should be passed through a coarse hair-sieve while hot, to remove the stones and skins of the fruit, and then poured into pots or glasses. It is usual to tie paper over the latter *dipped* in brandy. The following are the principal jams:—

Apricot jam. 6 dozen apricots, stoned and pared, or flesh of apricots, 2½ lbs.; white sugar 2 to 3 lbs.; yields about 4½ lbs. of jam.

Cherry jam. Stoned cherries 4 lbs.; white sugar 2 lbs.; about 2 lbs. of red currants, or a pint of currant juice improves it.

Gooseberry jam. Picked and stalked gooseberries (red or yellow) 22 lbs.; white sugar 12 lbs. *Product.* 26 lbs.

Orleans plum jam. Equal weight of fruit and sugar; the addition of a few ripe gooseberries and raspberries improves it.

Raspberry jam. Picked raspberries and white sugar, of each 14 lbs. *Product.* 26 lbs. A little white or red currant juice improves this jam.

Strawberry jam. As the last, either with or without the addition of currant juice.

JAPAN, BLACK. *Prep.* I. Burnt umber 8 oz.; true asphaltum 3 or 4 oz.; boiled linseed oil 1 gallon; grind the umber with a little of the oil; add it to the asphaltum, previously dissolved in a small quantity of the oil by heat; mix, add the remainder of the oil, boil, cool, and thin with a sufficient quantity of oil of turpentine. *Flexible.*

II. Shellac 1 oz.; wood naphtha 4 oz.; lamp-black to color; dissolve. *Inflexible.* Both are used for leather.

JAPAN, TRANSPARENT. *Prep.* Oil of turpentine 8 oz.; oil of lavender 6 oz.; camphor 1 dr.; bruised copal 2 oz.; dissolve. Used for japanning tin; quick-drying copal varnish is usually substituted.

JAPANNING. (From *Japan*, the country where this art originated.) The art of covering paper, wood, or metal with a coating of hard, brilliant, and durable varnish.

Proc. The material is colored or painted with various devices, as may be desired, next covered with a highly transparent varnish, (copal,) dried at a high temperature, and then polished. Wood and paper are first sized, polished, and varnished.

JAPONIC ACID. When catechine is exposed to the air in contact with caustic alkalis, black solutions (*alkaline japonates*) are formed; with carbonated alkalis, red solutions, (*alkaline rubinates;*) the acid of the former may be separated, and forms a black powder. (See CATECHINE.)

JATROPHIC ACID. *Syn.* CROTONIC ACID. A peculiar fatty acid, constituting the cathartic and poisonous ingredient of croton oil and seeds. It is volatile, very acid, has a nauseous odor, solid at 23° F., and vaporizes at 35° F. It forms salts called JATROPATES, or CROTONATES with the bases.

JAUMANGE. *Prep.* Isinglass 1 oz.; boiling water 10 or 12 oz.; dissolve; add any white sweet wine ½ pint, the yelks of 2 eggs beaten to a froth, and the grated yellow peel of 2 lemons; mix well, and boil over the fire to thicken, stirring all the time.

JAUNDICE. *Syn.* ICTERUS. In PATHOLOGY, a disease characterized by a yellow color of the eyes and skin, deep-colored urine, and pale alvine evacuations. It appears to arise from a disordered action of the biliary organs. Saline aperients, and small doses of blue-pill, followed by tonics, are the best remedies. Their action should be promoted by the copious use of diluents, (as saline waters,) and exercise in the open air. When there is much pain and vomiting, anodynes (as opium, morphia, &c.) may be administered.

JELLIES. (See GELATIN, and the following articles.)

*** Jellies may be colored in the same way as cakes, (see page 153,) and rendered transparent by clarification with white of egg. See CALVES' FEET JELLY.

JELLY, ALMOND. *Syn.* GELATINA AMYGDALARUM. *Prep.* Blanched sweet almonds and white sugar, of each 1 oz.; water 4 oz.; make an emulsion, strain, and add melted hartshorn jelly ½

lb.; orange-flower water 1 dr.; and essence of lemon 2 or 3 drops; mix well.

JELLY, ARROW ROOT. *Syn.* MADE ARROW ROOT. GELATINA MARANTÆ. *Prep.* Arrow root 1 oz.; rub to a smooth paste with a spoonful or two of cold water, then gradually add of boiling water half a pint, stirring all the while. It may be thinned with more water, if required, and flavored with milk, wine, sugar, and spices, according to the palate of the consumer. TOUS LES MOIS JELLY is made in the same way.

JELLY, BISCUIT. *Prep.* White biscuit, crushed beneath the rolling-pin, 4 oz.; cold water 2 quarts; soak for some hours, boil to one half, strain, evaporate to 1 pint, add white sugar 1 lb.; red wine 4 oz., and cinnamon 1 oz. Given in weakness of the stomach, and in dysentery and diarrhœa.

JELLY, BREAD. *Syn.* PANADA. GELATINA PANIS. *Prep.* Cut a French roll into slices, toast them on each side, and boil in one quart of water, until the whole forms a jelly, adding more water if required; strain, and flavor as above. Very nutritious. It may be made with broth from which the fat has been skimmed, instead of water.

JELLY, BROTH. *Syn.* SOUP JELLY. Broth, or soup from which the fat has been skimmed, evaporated until it becomes gelatinous on cooling. See SOUP, PORTABLE.

JELLY, CALVES' FEET. (See p. 156.)

JELLY, CEYLON MOSS. *Syn.* GELATINA FUCI AMYLACEI. *Prep.* (Dr. Sigmond.) Boil Ceylon moss ℥ss in water one quart, for 25 minutes, or till the liquid jellies on cooling; strain and flavor.

JELLY, CORSICAN MOSS. *Syn.* GELATINA HELMINTHOCORTI. *Prep.* (P. Cod.) Corsican wormweed or moss ℥j; water q. s. to yield ℥viij; boil for one hour; strain, add isinglass previously soaked in a little water, ʒj; refined sugar ℥ij; white wine f℥ij. Vermifuge.

JELLY, GRAVY. By evaporating meat gravies.

JELLY, HARTSHORN. *Syn.* GELATINA CORNU CERVI. *Prep.* (P. Cod.) Hartshorn shavings ℥viij; wash in water, then boil in clean water 3 pints, till reduced to one half; strain, press, add sugar ℥iv, the juice of one lemon, and the white of an egg beat up with a little cold water; mix well, clarify by heat, evaporate till it jellies on cooling, then add the peel of the lemon, and set in a cool place. It may be flavored with wine, and any of the spices. Very nutritious.

JELLY, ICELAND MOSS. *Syn.* GELATINA LICHENIS. *Prep.* (P. Cod.) Iceland moss ℥ij; soak for 1 or 2 days in cold water, then boil for one hour in water q. s. to yield a strong solution; strain, decant the clear after repose, apply heat, dissolve therein isinglass ʒj, evaporate to a proper consistence, put it into pots, and set them in a cool place. Nutritious. Recommended in phthisis. The jelly of Iceland moss and cinchona (Gelatina lichenis cum cinchona, P. Cod.) is made by adding ℥vj of sirup of cinchona to the above.

JELLY, IRISH MOSS. *Syn.* GELATINA CHONDRI. *Prep.* Soak Irish moss (carrageen) in cold water, then boil in water one quart to a proper consistence; strain, and flavor. Nutritious.

JELLY, ISINGLASS. *Syn.* CONFECTIONER'S JELLY. GELATINA ICTHYOCOLLÆ. *Prep.* Isinglass dissolved in water by boiling, and evaporated till it jellies on cooling. To render it quite transparent, it should be clarified with white of egg. (See CALVES' FEET JELLY.) Milk, wine, and spices may be added, according to taste. 1½ oz. of good isinglass makes a pint of very strong jelly. (See BLANCMANGE.)

JELLY, RESTORATIVE. (Dr. Radcliffe.) *Prep.* Boil a leg of pork in water 3 gallons, till reduced to 1 gallon, pour off the liquid, when cold remove the fat, add ½ oz. each of mace and nutmegs, again boil, and strain.

JELLY, RICE. *Syn.* CREME DE RIZ. Rice 3 spoonfuls; boil in water, add 10 sweet and 5 bitter almonds, and enough sugar; make an emulsion, and flavor with cinnamon or orange-flower water.

JELLY, SAGO. Soak sago in cold water one hour, strain, and boil in fresh water till it becomes transparent; then add wine, sugar, clear broth, milk, or spices, to flavor. 1 oz. of sago makes a pint of jelly.

JELLY, TAPIOCA. As the last. It may be flavored with lemon juice and peel, wine, or spices at pleasure. 1 oz. of tapioca makes a pint of jelly.

JELLIES, FRUIT. These are all prepared by boiling the strained juice of the fruit mixed with about half its weight of refined sugar, until it jellies on cooling, observing to carefully remove the scum as it rises. The process should be conducted by a gentle heat, and it is preferable not to add the sugar until the juice is somewhat concentrated, as by *lengthened* boiling the quality of the sugar is injured.

Jellies are placed in pots or glasses, like jams The following are the principal *fruit jellies*:—

Apple jelly. Strained apple juice 1 quart; sugar 1 lb.; boil to a jelly. When apple juice cannot be obtained, the fruit may be boiled with sufficient water to cover it, and the liquor pressed out and used as juice.

Barberry jelly. (Gelatina berberorum, P. E. 1744. Rob de berberis.) Barberries and refined sugar equal parts; as last. One pint of the strained juice to sugar 6 or 8 oz. makes a better jelly.

Cherry jelly. 1. Cornelian cherry jelly, (*Rob de cornis.*) Cornelian cherries 1 lb.; water ½ pint; bruise, boil, strain; add sugar 6 oz., and boil till the liquid jellies.—2. Kentish cherry jelly, (*Rob de cerasis.*) Strained juice 1 pint; refined sugar 6 oz.; boil down as before.

Currant jelly, (Rob de ribes.) 1. Juice of any variety of currants 1 pint; white sugar 6 to 8 oz.; as before. Black currant juice requires the most sugar; some add twice the above quantity of sugar to either sort.—2. Strained juice and powdered refined sugar equal parts; mix, stir for 3 or 4 hours, and put it into glasses; in about 3 days it will concrete into a jelly. Other fruit juice may be treated in the same way, especially gooseberry juice.

Elderberry jelly, (Rob of elderberries with sugar. Rob baccarum sambuci cum saccharo.) 1. Juice of elderberries 4 lbs.; sugar 1 to 2 lbs.—2. Juice 1 gallon; sugar 5½ lbs.; produces about one half the weight of jelly.

Gooseberry jelly. Dissolve sugar in one third of its weight of water, by boiling; it will be nearly solid when cold; add an equal weight of goose-

berry juice, and boil as before. Much boiling prevents it gelatinizing. (See CURRANT JELLY.)

Hybiscus jelly. Juice and sugar equal parts.

Lemon jelly. Isinglass 2 oz.; water 1 quart, boil, add sugar 1 lb.; clarify, and when nearly cold, add the juice of 5 lemons, and the grated yellow rinds of 2 oranges and 2 lemons; mix well, strain off the peel, and put it into glasses.

Orange jelly. Orange juice 1 pint; let it stand over the grated yellow rind of 3 or 4 of the oranges for a few hours, then strain, and add loaf sugar ½ lb. or more; isinglass 2 oz., dissolved in water 1 pint; mix, and put it into glasses before it cools.

Plum jelly, (Rob prunorum acidorum.) Unripe plums 8 lbs.; sugar 6 or 7 lbs. Ripe plums take less sugar.

Punch jelly. Isinglass 2 oz.; sugar 1½ lbs.; water 1 pint; dissolve, add lemon juice ½ pint; the peels of 2 lemons and 2 oranges, and ¼ pint each of rum and brandy; keep it in a covered vessel until cold, then liquefy it by a very gentle heat, strain, and pour it into moulds. A pleasant and deceptive way of swallowing alcohol.

Quince jelly, (Gelatina cydoniorum. Rob cydoniorum, P. E. 1744.) Quince jelly 3 lbs.; refined sugar 1 lb.; boil to a jelly.

Raspberry jelly. Juice 2 lbs.; sugar 1 lb.; boil down.

Strawberry jelly is made the same way.

*** The preceding fruit jams and jellies are refrigerant and laxative; they are mostly employed as relishes, &c.

JERVIN. A peculiar alkaloid, found by Simon, associated with barytin, in the rhizomes of white hellebore. It forms salts with the acids.

JUICE. *Syn.* SUCCUS, (*Lat.*) Suc; Jus, (*Fr.*) The reader is referred to the article VEGETABLE JUICES for the method of obtaining and preserving these liquids, especially the *expressed juices* employed in medicine, and termed *alcoolatures* by the French. The principal juices of commerce are—CITRON JUICE, (*succus citri, acetositas citrae,*) chiefly imported from Italy in large casks; —LEMON JUICE, (*succus limonis,*) from lemons that spoil before they can be sold; also imported; —ORANGE JUICE, (*succus aurantii,*) obtained from the same sources as that of lemons.—CONCENTRATED ORANGE JUICE, (*succus spissatus aurantii, vel aurantiorum,*) and CONCENTRATED LEMON JUICE, (*succus spissatus limonum,*) are prepared by evaporating the fresh juices of oranges and lemons, either alone or mixed with sugar, and are employed as substitutes for the fruit, where the latter cannot be obtained.

JUICE, REFINED. *Prep.* Italian juice 4 lbs.; gum arabic 1 lb.; water q. s.; dissolve, strain, gently evaporate to a pilular consistence, then roll into small cylinders, cut into lengths, and afterwards polish them by rubbing them together in a box. An inferior kind is made of equal parts of liquorice and common glue, but may readily be discovered by its less grateful taste. Expectorant; used as a lozenge to allay coughs. (See EXTRACT OF LIQUORICE.)

JULEP. *Syn.* JULAP. JULAPIUM; JULEPUS, (*Lat.*) JULEP, (*Fr.*) This term was formerly applied to those preparations at present called mixtures. (See MIXTURES, and the following.)

JULEP, ACID. *Syn.* JULAPIUM ACIDUM. *Prep.* (Fr. H.) Muriatic acid ʒj; simple sirup ℥j; water ½ pint; mix. *Dose.* 1 or 2 tablespoonfuls 3 or 4 times a day, after a course of mercury.

JULEP, ANODYNE. *Syn.* JUL. CALMANS POTIO ANODYNA. *Prep.* (P. Cod.) Lettuce water ℥iv; sirup of opium ʒij; orange-flower water ʒvj; to lull pain.

JULEP, CAMPHOR. *Syn.* JUL. CAMPHORÆ. *Prep.* (Collier.) Camphor 25 grs.; powdered gum ℥ss; simple or spearmint water ℥viij; make an emulsion. Anodyne, sedative. *Dose.* 2 or 3 tablespoonfuls or more, in hysteria, chorea, strangury, &c.

JULEP, DIAPHORETIC. *Syn.* JUL. DIAPHORETICUM. *Prep.* (E. H.) Compound mint water ℥iv; solution of acetate of ammonia ℥ij; sesquicarbonate of ammonia ℈ij; white sugar ʒvj to ℥j. *Dose.* 1 tablespoonful in fevers, &c.

JULEP, GUM. *Syn.* JUL. GUMMOSUM. POTIO GUMMOSA. *Prep.* (P. Cod.) Gum ʒij; sirup of althea ℥j; orange-flower water ℥ss; water ℥iij; mix. Demulcent. *Dose.* A tablespoonful ad libitum.

JULEP, LEMON. *Syn.* JUL. LIMONUM. *Prep.* (Germ. H.) Barley-water 1½ pints; lemon sirup ℥ij; sweet spirits of nitre 20 drops; mix. Demulcent and diaphoretic.

JULEP, ROSE. *Syn.* JUL. ROSATUM. *Prep.* (P. Cod.) Sugar lb. ij; rose-water lb. j; dissolve and filter. A pleasant demulcent, especially if mucilage ℥iv be added. VIOLET, ELDER, and ORANGE-FLOWER JULEPS, as well as several others from demulcent or odorous flowers, may be prepared in the same way, regulating the flavor by properly apportioning the quantity of distilled water; simple water being added, if required, to make up the deficiency.

JULEP, SQUILL. *Syn.* JUL. SCILLÆ. JUL. SCILLITICUM. *Prep.* Sirup of squills ℥ij; sweet fennel, aniseed, or pennyroyal-water ℥iv; mix. In coughs and hoarseness. *Dose.* 1 or 2 tablespoonfuls every 3 or 4 hours.

JULEP, SEDATIVE. *Syn.* JUL. SEDATIVUM. *Prep.* (Pierquin.) Camphor 6 grs.; compound spirit of sulphuric ether ʒiss; nitre 12 grs.; orange-flower water ℥iij; sirup of althea ʒiij; sirup of poppies ʒij; mix.

JULEP, TONIC. *Syn.* JUL. TONICUM. *Prep.* (Fr. H.) Sulphate of quinine 12 grs.; water ℥iv; add a few drops of dilute sulphuric to effect solution; when dissolved, further add compound tincture of gentian ℥j; and sirup of orange-peel or roses q. s. to make a six-ounce mixture. *Dose.* A tablespoonful 2 or 3 times a day.

JUNKET, DEVONSHIRE. *Prep.* Put warm milk into a bowl; turn it with a little rennet; then add some scalded cream, sugar, and cinnamon on the top, without breaking the curd.

KADODULE. (From κακός, *bad*, and ὀδωδή, *smell.*) The theoretical radical of a series of compounds, the best known of which is *Cadet's fuming liquor.* The following is a brief notice of the principal of these substances:—

OXIDE OF KADODULE. (*Alkarsine. Cadet's fuming liquor.*) Acetate of potassa and arsenious acid, equal parts; mix; slowly heat to redness in a glass retort, placed in a sand-bath, and connected with a receiver placed in a freezing mixture

Separate the heavier liquid that distils over, agitate it with water, and rectify it along with caustic potassa, in an atmosphere of carbonic acid. By a second rectification over lime or baryta it may be obtained anhydrous. A colorless liquid, boiling at 300°, congealing at —10° F., and evolving a very offensive odor, resembling arseniureted hydrogen. "It is *highly poisonous* in every shape." It possesses feeble basic properties, is soluble in alcohol and ether, sparingly soluble in water, and inflames spontaneously by exposure to the air.—SULPHURET OF KADODULE is formed by distilling a mixture of chloride of kadodule and hydrosulphuret of sulphuret of barium; a colorless fetid liquid, heavier than water, and very poisonous.—CYANIDE OF KADODULE is obtained by distilling a concentrated solution of bicyanide of mercury, along with alkarsine; fusible, volatile crystals.—CHLORIDE OF KADODULE is prepared by distilling alkarsine and bichloride of mercury; a colorless liquid, depositing crystals of *oxychloride of kadodule*, when exposed to the atmosphere.—IODIDE, BROMIDE, and FLUORIDE OF KADODULE resemble the last, and are prepared in a similar manner.—KADODYLIC ACID (*Alkargen*) is obtained when alkarsine is *gradually* exposed to the air, in the *cold*. As soon as a semi-solid mass is formed, it must be treated with *cold* water, the solution evaporated till it solidifies, and then pressed in bibulous paper, to remove *hydrarsine;* the residuum is dissolved in boiling absolute alcohol, and is again obtained in crystals as the liquid cools; by repeating the process several times with alcohol, or by evaporating the aqueous solution in a water-bath, and subsequent treatment with hydrated peroxide of iron, and a final crystallization from alcohol, pure *kadodylic acid* is obtained. Brittle, glossy, prismatic crystals, deliquescent, inodorous, tasteless, and soluble in water and alcohol.

*** All the preparations of kadodule are *exceedingly poisonous*, and therefore great caution should be exercised in experimenting on them. Even *very small* quantities of their vapors cause vomiting, numbness of the extremities, fainting, and other alarming symptoms. They all evolve a most offensive odor, and this property has led Bunsen to propose the following *test for arsenic and the acetates:*—A metallic sublimate boiled with water containing air until dissolved, the solution mixed with potash and acetic acid, evaporated to dryness, and the residuum heated in a test tube, wi evolve the horrible odors of alkarsine, if arsenic be present. This odor is rendered even more offensive by the addition of protochloride of tin to the ignited mass. As a test for the acetates, the addition of potassa and arsenic must be added. (Vide Turner's Chem., 7th ed., and also the Researches of Berzelius, and the more recent ones of Bunsen.)

KALEIDOSCOPE. (From καλος, *pretty;* ειδος, *form;* and σκοπεω, *I view.*) A pleasing, philosophical toy, invented by Sir David Brewster, which presents to the eye a series of symmetrical changing views. It is formed as follows:—Two slips of silvered glass, from 6 to 10 inches long, and from an inch to an inch and a half wide, and rather narrower at one end than the other, are joined together lengthwise, by one of their edges, by means of a piece of silk or cloth, glued on their backs; they are then placed in a tube (tin or pasteboard) blackened inside, and a little longer than is necessary to contain them, and are fixed, by means of small pieces of cork, with their faces at any angle to each other, that is an even aliquot part of 4 right angles, (as the one-sixth, one-eighth, one-tenth, &c.) The one end of the tube is then closed with an opaque screen, or cover, through which a small eyehole is made in the centre, and the other end fitted, first with a plate of common glass, and at the distance of about ⅛ of an inch, with a plain piece of slightly *ground* glass, parallel to the former; in the intermediate space or cell are placed the objects to form the images. These consist of colored pieces of glass, glass beads, or any other colored diaphonous bodies, sufficiently small to move freely in the cell, and to assume new positions when the tube is shaken or turned round. A tube so prepared presents an infinite number of changing and symmetrical pictures, no one of which can be *exactly* reproduced. This toy is easily constructed, and is very inexpensive; as any common tube of tin or pasteboard may be used, and strips of glass smoked on one side will answer for mirrors. Kaleidoscopes are commonly called *flower-glasses.*

KERMES MINERAL. *Syn.* KERMES MINERALIS. *Prep.* I. Black sesquisulphuret of antimony 4 lbs.; carbonate of potash 1 lb.; boil in water 2 gallons, for half an hour, filter, and cool *slowly;* the kermes will be deposited as the solution cools, and must be washed with water and dried. The undissolved portion of sesquisulphuret of antimony may be boiled again several times with fresh potash and water. The liquor decanted off the kermes will yield the GOLDEN SULPHURET OF ANTIMONY, on the addition of an acid; the acetic being generally used for this purpose.

II. Sesquisulphuret of antimony 1 lb.; carbonate of potash ½ lb.; flowers of sulphur 1 oz.; mix, melt, cool, powder, boil in water q. s.; filter while hot; the kermes is deposited as the liquid cools, and must be well washed with water.

III. (*Cluzell's kermes.*) Sulphuret of antimony 4 parts; crystallized carbonate of soda 90 parts; water 1000 parts; boil for 30 to 45 minutes, filter while hot into a warm vessel, and cool very slowly; in 24 hours collect the kermes, moderately wash with cold water, and dry at 70 or 80° F., folded up in paper, to exclude the air and light.

Remarks. The first two formulæ yield an orange-red powder; the third a very dark crimson powder, of a smooth velvety appearance. It is a *hydrated oxysulphuret of antimony,* (Gay Lussac;) *a hydrated sesquisulphuret,* (Berzelius.) *Dose.* ½ gr. to 4 grs. as a diaphoretic, cathartic, or emetic. It occupies in foreign practice the place of our James's Powder.

KETCHUP. *Syn.* CATSUP. KATCHUP. *Prep.* I. (*Camp ketchup.*) Old strong beer 2 quarts; white wine 1 quart; anchovies 4 oz.; mix, boil for 10 minutes, remove it from the fire, and add of peeled shalotes 3 oz.; mace, nutmegs, ginger, and black pepper, of each ½ oz.; macerate for 14 days and bottle.

II. (*Cucumber ketchup.*) From ripe cucumbers, in the same way as mushroom ketchup. Mixed with cream, or melted butter, it forms an excellent *white sauce* for fowls, &c.

III. (*For sea stores.*) Stale strong beer 1 gal-

to correct their acidity, but it is believed that this poisonous substance is now never employed in this country, and that the lead which is frequently detected in bottled wine may be traced to shot being left in the bottle, and not to fraud. The presence of lead in wine may be readily detected by the addition of a little sulphureted hydrogen, or a solution of any hydrosulphuret, which will in that case produce a black precipitate. Sherry is commonly colored in Spain by the addition of *must*, boiled down to one-fifth of its original volume, and in England by burnt brown sugar, or spirit coloring. Amontillado (a very nutty wine) is commonly added to sherries deficient in flavor; various other ingredients, as the essential oil of bitter almonds, bitter almonds in substance, cherry-laurel leaves and water, &c., are also employed for a like purpose. In Portugal the juice of elderberries is frequently added to *port wine* to increase its color, and extract of rhatany for the double purpose of improving its color, and imparting an astringent taste. The use of the former was once carried to such an extent that the Wine Company of Portugal put themselves to the expense and trouble of rooting out all the elder trees, and prohibiting their growth in the wine district. In England, beet-root, Brazil wood, the juice of elderberries and bilberries, the pressed cake from making elder wine, extract of logwood, &c., are frequently added to port to deepen its color; and oak sawdust, kino, alum, and extract of rhatany, to increase its astringency. Genuine red wines yield greenish gray precipitates with sugar of lead, and greenish ones with potassa; but those colored with elderberries, bilberries, and logwood, give *deep blue*, or *violet* precipitates, and those colored with Brazil, red sanders wood, or red beet, give red precipitates. *A factitious bouquet* is also commonly given to wine by the addition of sweetbrier, orris root, clary, elder-flowers, &c. The latter can only be detected by a discriminating and sensitive palate.

Uses. The uses of wine as a beverage are too well known to require description. As a MEDICINE, *port wine* is most esteemed as an astringent and tonic; and *sherry* and *Madeira* as stimulants and restoratives, in diseases where the acidity of the former would be objectionable; *champagne* is diuretic and excitant; and the *Rhenish wines* are refrigerant, diuretic, and slightly aperient. *Claret, Rhenish*, and *Moselle wines* are the most wholesome. In pharmacy wine is used as a menstruum.

MANAGEMENT OF WINE. *Age.* The sparkling wines are in their prime in from 18 to 30 months after the vintage, depending on the cellaring and climate. Weak wines, of inferior growths, should be drunk within 12 or 15 months, and be preserved in a very cool cellar. Sound, well-fermented, full-bodied wines are improved by age, within reasonable limits, provided they be well preserved from the air, and stored in a cool place, having a pretty uniform temperature. To promote the ripening of wine, some persons cover the mouths of the casks or bottles with bladder, and others remove them into a warmer situation. A very little dilute sulphuric acid is commonly added to the coarser wines for the same purpose; but a small quantity of pure acetic or tartaric acid would be preferable. 2 or 3 drops of the former, added to a bottle of some kinds of new wine, immediately give it the appearance of being 2 or 3 years old.

Bottling. The secret of bottling wine with success consists in the simple exercise of care and cleanliness. The BOTTLES should be all *sound, clean*, and *dry*, and perfectly free from the least *mustiness* or other odor. The CORKS should be of the best quality, and immediately before being placed in the bottles should be compressed by means of a "cork-squeezer." For superior or very delicate wines, the corks are usually prepared by placing them in a copper or tub, covering them with weights to keep them down, and then pouring over them boiling water, holding a little pearl-ash in solution. In this state they are allowed to remain for 24 hours, when they are drained, and reimmersed for a second 24 hours in hot water, after which they are well washed and soaked in several successive portions of clear rain water, drained, dried out of contact with dust, put into paper bags, and hung up in a dry place for use. The WINE should be *clear* and *brilliant*, and if it be not so, it must undergo the process of "fining" before being bottled. In fact, it is a common practice with some persons to perform this operation whether the wine requires it or not; as if it has been mixed and doctored, it "amalgamates and ameliorates the various flavors." The *bottles, corks*, and *wine* being ready, a fine clear day should be preferably chosen for bottling, and the utmost cleanliness and care should be exercised during the process. Great caution should also be observed to avoid shaking the cask so as to disturb the bottoms. The remaining portion that cannot be drawn off clear should be passed through the "wine bag," and when bottled should be set apart as inferior to the rest. The coopers, to prevent breakage and loss, place each bottle, before corking it, in a small bucket, having a bottom made of soft cork. They thus seldom break a bottle, though they "flog" in the corks very hard. When the wine is all bottled, it is stored in a cool cellar, and on *no account on the bottles' bottoms*, or in *damp straw*, but *on their sides*, in *sweet, dry sawdust or sand.*

Brandying. Brandy is frequently added to weak or vapid wines, to increase their strength, or to promote their preservation. In Portugal *one third* of brandy is commonly added to port before shipping it for England, as without this addition it generally passes into the acetous fermentation during the voyage. A little good brandy is also usually added to sherry before it leaves Spain. By recent regulations of the customs of England, 10% of brandy may be added to wines in bond, and the increased quantity is only charged the usual duty on wine. The addition of brandy to wine injures its proper flavor, and hence is chiefly made to port, sherry, and other wines, whose flavor is so strong as not to be easily injured. Even when brandy is added to wines of the latter description, they require to be kept for some time to recover their natural flavor. To promote this object, the *wine doctors* employ the process called "*fretting in*," by which they effect the same change in 3 or 4 weeks, as would otherwise require some months, at the very least.

Cellaring. A wine cellar should be dry at bottom, and either covered with good hard gravel, or

II. Yellow wax, rosin, and lard, equal parts; melt, and color with powdered ivory black.

LABELS, INSOLUBLE. Lay a coat of strained white of egg over the label, and immediately put the vessel into the upper portion of a common steampan, or otherwise expose it to a gentle heat till the albumen coagulates and turns opaque, then take it out and dry it in an oven, at a heat of about 212°; the opaque white film will then become hard and transparent, and resist the action of oils, spirits, and water. (Chem., iii. 158.) The labels on bottles containing acids or alkaline solutions, should be either etched upon the glass by fluoric acid, or be written with incorrodible ink. (See INKS and ETCHING.)

LABORATORY. *Syn.* ELABORATORY. LABORATOIRE, (*Fr.*) LABORATORIUM, (*Lat.*, from *laboro*, I labor.) A place fitted up for the performance of chemical operations. It was our intention to have described the best mode of fitting up a chemical and a pharmaceutical laboratory, both on the small and large scale, and also to have presented the reader with a copper-plate engraving of the laboratory of Giessen, but from want of room we are compelled to withdraw the article and illustrations. We must therefore content ourselves with recommending the reader to consult the last edition of Faraday's "*Chemical Manipulation*," a work replete with correct and valuable information. Among PORTABLE LABORATORIES, the cheapest and best arranged are those of Mr. Robert Best Ede, of Dorking, which may be purchased at prices varying from 16*s.* to £6 or £8. That at the former price contains more than 40 chemical preparations and appropriate apparatus, and is well adapted to amuse the juvenile experimentalist, and at the same time to afford him a ready introduction to chemical knowledge. The *chemical laboratory*, or *portable chemical cabinet*, at the higher price, contains upwards of 130 select chemical preparations and newly-invented apparatus, and is calculated for performing experiments both of demonstration and research, with perfect readiness and safety, either in the drawing-room or class-room. It is also very elegantly and compactly got up, and forms a suitable object for the side-table of every student. This cabinet has received the approval of Prof. Graham, which is no ordinary recommendation.

LAC. *Syn.* LAQUE, (*Fr.*) LACK, (*Ger.*) LACCA, (*Lat.*) Stick lac, (*lacca in ramulis, lacca in baculis;*) seed lac, (*lacca in granis, lacca in seminis;*) lump lac, (*lacca in massis;*) shell lac, (*lacca in tabulis.*) All the preceding differ only in color and form. Shell lac is most generally used; the palest is the best. They are all said to be calefacient, attenuant, aperient, diaphoretic, and diuretic. Lac is used in dentifrices, in varnishes, lacquers, and sealing-wax, and to make toys and trinkets.

LAC DYE. A coloring substance used to dye scarlet, imported from the East Indies in small cubical cakes. It is prepared by digesting ground stick lac in water, and evaporating the colored infusion to dryness.

LAC LAKE. *Syn.* LAC COLOR. EAST INDIAN COCHINEAL. A superior kind of lac dye, also imported, and prepared by dissolving out the color of ground stick lac by means of a weak alkaline solution, and then precipitating it along with alumina by adding a solution of alum. Either of the above dissolved in an equal weight of muriatic acid, (sp. gr. 1·19, and holding in solution about $\frac{1}{20}$ of grain tin,) by digestion for about 6 hours, and then added to hot water, along with about as much tartar as lac dye, ½ that quantity of ground sumach, and about ½ of solution of tin, dyes cloth of a brilliant scarlet color; 1 lb. of good lac dye is sufficient for 10 lbs. of cloth. In some cases the stuff is first yellowed with quercitron.

LAC VARNISH, (AQUEOUS.) *Prep.* Pale shellac 5 oz.; borax 1 oz.; water 1 pint; digest at nearly the boiling point until dissolved; then strain. Equal to the more costly spirit varnish for many purposes; it is an excellent vehicle for water colors, inks, &c.; when dry it is waterproof.

LAC, WHITE. Dissolve shellac in a lye of pearlash or caustic potassa by boiling; filter, pass chlorine through it in excess, wash the precipitate and digest. Forms an excellent pale varnish with alcohol.

LAC FERRATUM. *Prep.* (P.E. 1744.) Repeatedly quench red hot iron in fresh milk.

LACCIC ACID. A crystalline, wine-yellow colored, sour substance, soluble in water, alcohol, and ether, extracted by Dr. John from stick lac. It forms salts called LACCATES with the bases.

LACCINE. A substance discovered in shellac by Unverdorben. It is the portion left after all the matters soluble in water, ether, and alcohol, have been dissolved out. Brittle, yellow, translucent, soluble in caustic potassa and in sulphuric acid.

LACQUER. *Syn.* LACKER. LAQUE, (*Fr.*) A solution chiefly of shellac in alcohol, tinged with saffron, annotto, aloes, and other coloring matters. It is applied to wood and metals to impart a golden color. (See VARNISH.)

LACTIC ACID. (From *lac*, milk.) *Syn.* ACID OF MILK. NANCEIC ACID, (Braconnot.) ACID LACTIQUE, (*Fr.*) MILCHSAURE, (*Ger.*) ACIDUM LACTICUM, (*Lat.*) A sour sirupy liquid discovered by Scheele in whey. Also found in some other animal fluids, and in several vegetable juices, especially in that of beet-root.

Prep. I. Dissolve lactate of baryta in water, and precipitate the baryta with dilute sulphuric acid, carefully avoiding excess; evaporate.

II. (Scheele.) Evaporate sour whey to ⅛, saturate with slaked lime, filter, add 3 or 4 times the quantity of water, cautiously precipitate the lime with oxalic acid, filter, and evaporate to dryness in a water-bath; digest the residuum in strong alcohol, filter, and again evaporate. It may be then further purified by saturation with baryta, evaporation, crystallization, re-solution in water, and the careful addition of dilute sulphuric acid as before; lastly evaporate.

III. (Boutron and Fremy.) Milk 3 or 4 quarts; sugar of milk 200 to 300 grs.; mix, and expose for 2 or 3 days in an open vessel at 20 to 25° C.; saturate with bicarbonate of soda, again expose at a moderate temperature, saturate with more bicarbonate of soda, and repeat the process until the whole of the sugar of milk be decomposed; then coagulate the caseine by heat, filter, evaporate, extract the acid lactate of soda by alcohol of sp. gr. 0·810, and decompose it by the cautious

elder flowers, quinces, cherry-laurel water, &c. By the skilful, though fraudulent use of the above flavoring substances and perfumes, the experienced wine-brewer manages to produce, in the dark cellars of London, from white cape, currant, gooseberry, raisin, rhubarb, parsnip, and malt wine, very excellent imitations of foreign wine, and which pass current among the majority of English wine-drinkers as the choicest productions of the grape, "*genuine as imported.*"—A grain or two of ambergris, well rubbed down with sugar, and added to a hogshead of claret, gives it a flavor and bouquet much esteemed by some connoisseurs.

Improving. This is the cant term of the wine trade, under which all the adulteration and "doctoring" of wine is carried on. A poor *sherry* is improved by the addition of a little *almond flavor, honey, and spirit;*—a *port* deficient in body and astringency, by the addition of some red tartar, (dissolved in boiling water,) some kino, rhatany, or catechu, and a little honey and brandy.

Mixing. Few wines are sold without admixture. It is found that the intoxicating properties of wine are increased by mixing them with other wines of a different age and growth. In many cases the flavor is at the same time improved. Thus, a *thin port* is improved by the addition of a similar wine having a full body, or by a little Malaga, Teneriffe, or rich old sherry; and an *inferior old sherry* may be improved by admixture with a little full-bodied wine of the last vintage. In this consists the great art of "cellar management," and to such an extent is this carried, both abroad and in England, that it may be confidently asserted that no wine ever reaches the consumer in an *unmixed* or *natural* state.

Mustiness. This is easiest removed by violently agitating the wine for some time with a little of the sweetest olive or almond oil. The cause of the bad taste is the presence of an essential oil, which the fixed oil seizes on and rises with it to the surface, when it may be skimmed off. A little coarsely-powdered fresh-burnt charcoal, or even some slices of bread toasted black, will frequently have a like effect. A little bruised mustard is used by some persons.

Perfuming. This is chiefly performed on British wines for family use. For its application to foreign wines, see *flavoring*. Wines may be perfumed by the simple addition of any odorous substances previously well mixed with a little of the wine, or dissolved in a few oz. of spirit.

Racking. This should be performed in cool weather, and preferably early in the spring. To avoid disturbing the dregs, a clean syphon, well managed, will be found better than a cock or faucet. The bottoms, or foul portion, may be strained through a wine bag, and added to some other inferior wine.

Ripening. To promote the maturation of wine, various plans are adopted by the growers and dealers. One of the safest ways, especially for strong wines, is not to rack them till they have stood 15 or 18 months upon the lees, at the same time regulating the temperature upon the principles described under FERMENTATION. In this way, the slow or insensible fermentation which causes the maturation of wine, will be promoted, without the access of the acetous fermentation, or that which causes acidity.—*Another safe method* is, to remove the racked wine into a rather warmer situation than usual, observing properly to exclude the action of the air, which cannot be done with wine in wood, if the place be very dry.—*A third method* is to remove the corks or bungs, and to substitute bladder tied or fastened over air-tight. Bottled wine treated in this way, ripens very quickly in a temperate situation.

Roughening. A roughness or astringency is readily communicated to wine by the cautious use of kino, catechu, or rhatany.

Ropiness or viscidity. This arises from the wine containing too little tannin or astringent matter to precipitate the gluten, albumen, or other azotized substance, occasioning the malady. Such wine cannot be clarified in the ordinary way, because it is incapable of causing the coagulation or precipitation of the finings. The remedy is to supply the principle in which it is deficient. M. François of Nantes prescribes the bruised berries of the mountain ash (1 lb. to the barrel) for this purpose. A little catechu, kino, or the bruised foot stalks of the grape, may also be conveniently and advantageously used in the same way. Any other substance that precipitates albumen, may likewise be employed. See MALT LIQUORS and BREWING.

Second Fermentation. (La-pousse of the French.) Inordinate fermentation, either primary or secondary, in wine or any other fermented liquor, may be readily checked by racking it into a cask which has been previously fumigated with burning sulphur; or one half of the wine may be drawn off from the cask, and a lighted match, made by dipping some rags in melted brimstone, may be held by a pair of tongs in the bung-hole, slightly covered, so as to impregnate the liquor with the fumes. The decanted portion of the wine is then returned to the cask, which is immediately bunged down close, and well agitated for a few minutes. 1 oz. of brimstone thus employed is sufficient for a hogshead. This is the common plan adopted in the wine districts of France, either to allay the fermentation of wine, or to preserve *must* or grape juice in the sweet state.—*Another method*, which is very convenient and harmless, is to mix about ½ lb. to 1 lb. of bruised mustard seed with each hogshead.—*A fourth method* is to add to the wine about 1-1000th part, or less, of sulphite of lime. This substance seldom fails of arresting the fermentation.—In addition to the above remedies, a little sulphuric acid is sometimes employed, and the use of black oxide of manganese, or chlorate of potash, has been proposed on theoretical grounds.

Souring. This is either occasioned by the wine having been imperfectly fermented, or from its having been kept in a cellar where it has been exposed to too much heat or air, or to continual vibrations, occasioned by the passage of loaded vehicles through the adjoining thoroughfare. The common remedy recommended in books for this purpose, is to saturate the acid with chalk, milk of lime, or calcined oyster shells; but such additions, made in sufficient quantity to effect this object, destroy the character of the wine, and render it sickly and vapid. Formerly it was a very common practice to add litharge to alleviate the acidity; but the wine was thus rendered highly injurious to health, and frequently converted into a cer-

their color to water; many of which will be found to possess great beauty and permanence. The precise process adapted to each particular substance may be easily ascertained, by taking a few drops of its infusion or decoction, and observing the effects of alkalis and acids on the color. The quantity of alum or alumina employed, should be nearly sufficient to decolor the dye liquor, and the potash should be so proportioned to the alum as exactly to precipitate it, without leaving free or carbonated alkali in the liquid. The first portion of the precipitate has the deepest color, and the shade gradually becomes paler. A beautiful tone of violet, red, and even purple, may be communicated to the coloring matter of cochineal by the addition of nitro-muriate or permuriate of tin; the addition of arseniate of potash (neutral arsenical salt) in like manner, gives shades which may be sought for in vain with alum or alumina. Lake should be carefully dried, and when intended for sale, made up into conical or pyramidal drops, which is done by dropping the moist lake through a small funnel on a clean board.

LAKE, BLUE. Prepared from some of the blue-colored flowers; fugitive. The name is also applied to lump archel, (*lacca cærulea*,) to moist alumina colored with indigo, and to mixed solutions of pearlash and prussiate of potash, precipitated with another solution of sulphate of iron and alum; permanent and beautiful. (See Blue, Saxon.)

LAKE, BRAZIL WOOD. *Syn.* Drop Lake. Lacca in Globulis. *Prep.* I. Ground Brazil wood 1 lb.; water 4 gals.; boil for 20 minutes; add 1½ lbs. of alum dissolved in water; mix well, decant, strain, add ½ lb. of solution of tin to brighten the color, and then precipitate with a solution of potash or carbonate of soda, carefully avoiding excess. *Product.* Deep red. An excess of alkali turns it on the violet, and the addition of cream of tartar, on the brownish red. The tint turns more on the mellow violet red when the solution of tin is omitted. Some persons use less, some more alum. The first portion of the precipitated lake has the brightest color.

II. Add washed and recently-precipitated alumina to a strong and filtered decoction of Brazil wood. Both the above must be carefully collected, dried, and made up into drops.

LAKE, CARMINATED. *Syn.* Florence Lake. Florentine do. Paris do. Vienna do. Lacca Florentina. *Prep.* I. Boil the residuum of cochineal, left in making carmine, with repeated portions of water till it ceases to yield color; filter; mix it with the liquor decanted off the carmine; filter; add some recently-precipitated alumina, apply a gentle heat, and agitate well. As soon as the alumina has absorbed sufficient color, allow the mixture to settle; decant the clear liquid, collect the lake on a filter, and carefully dry it. The decanted liquor, if still colored, may now be treated with fresh alumina until exhausted, and thus a lake of a second quality may be obtained. Very fine.

II. To the colored liquor obtained from the carmine and cochineal as above, add a solution of alum, mix well, filter, and precipitate with a solution of potash; collect the lake and dry it as before. Not quite so good as the last.

Remarks. Some makers add a little solution of tin to the colored liquor before adding the alum or alumina; this brightens the color. The above lake is a good glazing color with oil, but has little body.

LAKE, GREEN. Made by mixing blue and yellow lakes together. Seldom used.

LAKE, MADDER. *Syn.* Lacca Columbina. *Prep.* I. (Sir H. C. Inglefield.) Dutch grappe or crop madder 2 oz.; tie it up in a cloth, beat it well in a pint of water in a stone mortar, and repeat the process with fresh water (about 5 pints) till it ceases to yield color; boil the mixed liquors in an earthen vessel, pour it into a large basin; add alum 1 oz.; dissolve in boiling water 1 pint; stir well, and while stirring pour in gradually of saturated solution of carbonate of potash (oil of tartar) about 1½ oz.; let it stand to settle until cold, then pour off the supernatant yellow liquor, drain, agitate the residue with boiling water 1 quart; decant, drain, and dry. *Product*, ½ oz. The Society of Arts voted their gold medal to the author of the above formula.

II. (Ure.) Ground madder 2 lbs.; water 1 gallon; mix, macerate with agitation for 10 minutes, strain off the water, and press the remainder quite dry; repeat the same process a second and a third time; then add water 3 qts., and alum ½ lb., and heat in a water-bath for 3 or 4 hours, adding water as the liquor evaporates; filter, first through a flannel, and when sufficiently cold, through paper; then add a solution of carbonate of potash as long as a precipitate falls, which must be washed, till the water comes off colorless, and then dried. If the alkali be added in 3 successive doses, 3 different lakes will be obtained, successively diminishing in beauty.

III. Add acetate of lead to a decoction of madder, to throw down the brown coloring matter, filter, then add a solution of tin or alum, and precipitate with a solution of carbonate of soda or potash.

LAKE, ORANGE. *Prep.* Best Spanish annotto 4 oz.; pearlash 1 lb. or less; water 1 gallon; boil for half an hour, strain, precipitate with alum 1½ lbs., dissolved in water 1 gallon, observing not to add the latter solution when it ceases to produce an effervescence or a precipitate; strain, and dry the sediment in small squares or lozenges. The addition of solution of tin turns this lake on the lemon yellow; acids redden it.

LAKE, RED. *Prep.* I. Coarsely-powdered cochineal 1 oz.; water and rectified spirit of wine, of each 2 oz.; digest for a week, filter, and precipitate with a few drops of solution of tin, added every 2 hours, till the whole of the color is thrown down; wash in distilled water, and dry. Very fine.

II. Coarsely-powdered cochineal 1 lb.; water 2 gallons; boil 1 hour, decant, strain, add a solution of pearlash 1 lb. or more, and precipitate with a solution of alum. If the alum be added first, and the lake precipitated with the alkali, the color will be slightly varied. Some persons use a solution of cuttlefish-bone in muriatic or nitric acid; but this increases the expense, and yields an inferior product.

III. Pearlash 1 lb.; clean shreds of scarlet cloth 3 or 4 lbs.; water 4 or 5 gallons; boil till

the cloth is decolored, filter, and precipitate with a solution of alum.

LAKE, YELLOW. *Prep.* Boil French berries, quercitron, or turmeric 1 lb. and potash 1 oz.; in water 1 gallon, till reduced to one half, strain, and precipitate with a solution of alum.—Or boil 1 lb. of the dye-stuff with alum ½ lb.; water 1 gallon, as before, and precipitate with a solution of carbonate of potash. (See LAKE, ORANGE.)

LAMPIC ACID. When the wick of a spirit-lamp is surrounded with a spiral coil of platinum wire, and after burning for a short time, is blown out, combustion still goes on, and a peculiar acid product results, which has been called lampic acid. It was first examined by Prof. Daniell. It may be more easily collected by placing a small bottomless retort over a heated platinum capsule, and gradually dropping in, from time to time, a little alcohol or ether. (R. F. Marchand.) It consists of a mixture of acetic, formic, and aldehydic acids, in variable proportions. (MM. Stass and Marchand.) Its most remarkable property is its power of reducing certain metallic solutions. With the bases it forms salts called *lampates*, which may be prepared by saturating the acid with the hydrated oxides or carbonates. (See ALDEHYDIC ACID.)

LAMPS. To prevent or lessen the smoking of lamps, the wicks should be well soaked, either in dilute muriatic acid, well washed in water, and dried, or in strong vinegar, when they will merely require drying. Large lamps, that emit much smoke, should be burnt under a funnel, to carry it off; or a large sponge, dipped in water, may be suspended over them; in all cases, the wicks should not be put up too high.

LANTANIUM, (from λανθανω, *I lurk.*) A rare metal, recently discovered by Mosander, associated with the oxide of cerium. (See CERIUM.)

LAPIS DIVINUS. *Syn.* LAPIS OPHTHALMICUS. *Prep.* Blue vitriol, nitre, alum, and camphor, equal parts, melted together, adding the camphor last. (Woolfuss.) Verdigris, nitre, and alum, equal parts, melted together. (Beer.) Alum, nitre, and blue vitriol 3 oz.; camphor 1 dr.; as last. (P. Cod.) Used to make an eyewater; 1 oz. to water 1 pint.

LAPIS MEDICAMENTOSUS. *Prep.* (P. L. 1746.) Alum, litharge, Armenian bole, and colcothar, of each 3 oz.; vinegar 4 oz.; mix and evaporate. Used to make a lotion: 1 oz. to water 1 pint. Astringent, detergent; once a popular application to ulcers.

LARD. *Syn.* HOGS' LARD. AUXUNGE. AXUNGIA. ADEPS. ADEPS SUILLUS. ADEPS PORCI. ADEPS PRÆPARATUS. The fat of the pig, melted by a gentle heat, and strained through a hair sieve or flannel. The fat about the loins yields the whitest and hardest lard. Used to make ointments, and in cookery.

LARD, OXYGENATED. See NITRIC ACID OINTMENT.

LAUDANUM, QUINCE. *Syn.* EXTRACTUM OPII SEU LAUDANUM CYDONIATUM. *Prep.* Opium ½ lb.; quince juice 6 lbs.; digest, filter, evaporate to an extract, and add while warm, oils of cinnamon, cloves, and mace, of each 10 drops. Milder than crude opium; seldom used.

LAUDANUM, FORD'S. *Prep.* Opium ℥j; cinnamon and cloves, of each ʒj; rectified spirit of wine and water, of each, ℥viij; digest for a week, and filter. This is merely an *aromatized tincture of opium. Dose.* 10 to 80 drops.

LAUDANUM, LIQUID. *Prep.* 1. (*Liquid quince laudanum. Laudanum liquidum cydoniatum. Laudanum liquidum cydoniatum paratum fermentatione.*) Opium ℥iv; saffron ℥ij; quince juice 1 quart; yeast 4 spoonfuls; ferment, express the liquor, filter, and add cinnamon ℥ij; cloves, aloes wood, and yellow sandal wood, of each, ʒij; digest for 14 days, filter, and evaporate to one half. Narcotic, anodyne; similar to black drop. *Dose.* 10 to 30 drops. Seldom used.

2. (Neuman's.) Opium fermented with water, and evaporated to the consistence of honey. Similar to the aqueous extract of opium.

3. (Sydenham's. *Laudanum liquidum Sydenhami.*) Opium ℥ij; saffron ℥j; cinnamon and cloves, of each, ʒj; white wine f℥xvj; digest. Contains ⅛ of opium. See WINE OF OPIUM, P. L., which is always substituted.

4. (*Laudanum tartarized. Laudanum liquidum tartarizatum.*) Opium ℥ij; saffron ℥j; cinnamon, cloves, mace, nutmegs, and aloes wood, of each, ʒj; tincture of salt of tartar f℥xxxij; digest, strain, and evaporate to one half. Seldom used.

LAVENDER, SMITH'S BRITISH. *Syn.* SMITH'S LAVENDER WATER. *Prep.* English oil of lavender 2 oz.; essence of ambergris 1 oz.; eau de Cologne 1 pint; rectified spirit 1 quart; mix. Very fragrant.

LEAD. *Syn.* PLOMB, (*Fr.*) BLEI, (*Ger.*) PLUMBUM, (*Lat.*) μόλιβδος, (*Gr.*) SATURN, (*Alc.*) This metal, like gold, silver, and iron, appears to have been known in the most remote ages of antiquity: "Oh that my words were now written! Oh that they were printed in a book; that they were graven with an *iron* pen and *lead* in the rock for ever!" (Job, xix. 23-4.)

Prep. Lead is only prepared on the large scale. It is usually extracted from galena, a natural sulphuret of lead, by roasting the ore in a reverberatory furnace, and afterwards smelting it along with coal and lime.

Prop. The common properties of lead are too well known to require notice. Its sp. gr., in a state of absolute purity, is 11·38 to 11·44, but ordinary lead seldom exceeds 11·352 to 11·353. It melts at 612° Fahr., (Crighton, 634° Kupfer,) and when very slowly cooled, crystallizes in octohedrons. It is malleable and ductile, but devoid of elasticity. Lead is not dissolved by muriatic, sulphuric, or the vegetable acids, unless by free contact with air, and then very slowly; but nitric acid rapidly oxidizes it, forming a solution of nitrate of lead. *Pure* water, put into a leaden vessel, and exposed to the air, soon corrodes it, and dissolves the newly-formed oxide; but river and spring water exerts no such influence, the carbonates and sulphates in such water destroying its solvent power. Many other neutral salts act in the same way. Among these, the most powerful preservatives are the phosphates, sulphates, chlorides, and iodides; their power being in proportion to the relative insolubility of the compound which their acid is capable of forming with lead. It has been found that 1-30,000th part of phosphate of soda or iodide of potassium, dissolved in dis-

tilled water, prevents its corrosive action. (Christison.) The lead in contact with such water, gradually becomes covered with a superficial film of an insoluble salt of lead, which adheres tenaciously, and all further change ceases. Thus ordinary water, which abounds in mineral salts, may be safely kept in leaden cisterns; but distilled and rain water, and water that contains scarcely any saline matter, speedily corrode, and dissolve a portion of lead, when kept in vessels of that metal. When, however, leaden cisterns have iron or zinc fastenings or braces, a galvanic action is set up, the preservative power of saline matter ceases, and the water speedily becomes contaminated with lead. Water containing free carbonic acid also acts on lead; and this is the reason why the water of some springs, kept in leaden cisterns, or raised by leaden pumps, possesses unwholesome properties. Free carbonic acid is evolved during the fermentation or decay of vegetable matter, and hence the propriety of preventing the leaves of trees falling into water-cisterns formed of lead. The neglect of this precaution gave rise to the violent ravages of colic that are recorded to have visited Amsterdam about the middle of the last century. (Dr. Frouchin.) The eau de rose and the eau d'orange of commerce, which are pure distilled water, holding in solution small quantities of essential oil, and are imported in leaden canisters, always contain a small quantity of lead, and deposite a sediment, which is not the case when they are kept in glass or incorrodible vessels. Lead and all its preparations are poisonous.

Uses. The uses of lead in the arts are well known. Some of its preparations are employed in medicine, generally externally.

Ant. Administer an emetic of sulphate of zinc or copper, and tickle the fauces with the finger or a feather to induce vomiting. Epsom or glauber salts, or alum, dissolved in water, tea, water gruel, or barley water, are the proper antidotes, and should be taken as soon after the poison has been swallowed as possible. When the symptoms are those of *lead colic*, the treatment recommended at page 206 should be adopted. In *paralysis* arising from lead, small doses of strychnia, brucia, and their preparations, should be *cautiously* administered. A symptom of poisoning by lead is the formation of a narrow leaden blue line, about one-twentieth of an inch thick, bordering the edges of the gums, attached to the neck of two or more teeth of either jaw. (Dr. Burton.)

Tests. 1. The salts of lead placed on charcoal all yield, by the blowpipe, a butter of lead.—2. Solutions of the salts of lead may be recognised by the color of the precipitates produced by the following tests:—*a.* Alkalis, alkaline carbonates, sulphates, prussiate of potash, infusion of galls, gallic acid, and sulphuric acid, produce *white* precipitates.—*b.* Chromate of potash, and iodide of potassium, *yellow* precipitates.—*c.* Hydrosulphates, sulphurets, and sulphureted hydrogen, *black* precipitates.—*d.* A piece of polished zinc precipitates metallic lead in an arborescent form, hence called the "*leaden tree.*" *** A solid supposed to contain lead should be dissolved in, or treated with nitric acid, evaporated to dryness, and redissolved in water, when it may be tested as above. *The susceptibility of sulphureted hydrogen* as a test for lead ceases when the dilution reaches 500,000 times,—*chromate of potash* at 100,000 times,—*carbonates of soda and potassa* at 60,000 times,—*potassa* at 20,000 times,—*prussiate of potash* at 18,000 times,—*iodide of potassium* at 10,000 times,—and *sulphate of soda* at 5000 times. (Devergie, Méd. Lég. ii. 779.) (See ORES.)

LEAD, ACETATE. *Syn.* NEUTRAL ACETATE OF LEAD. SUGAR OF LEAD. ACETATED CERUSE. SUPERACETATE OF LEAD. ACETATE DE PLOMB; SEL DE SATURNE, (*Fr.*) ESSIGSAURES BLEIOXYD; BLEIZUCKER, (*Ger.*) SACCHARUM SATURNI, (P. L. 1720.) CERUSSA ACETATA, (P. L. 1788.) PLUMBI SUPERACETAS, (P. L. 1809.) PLUMBI SACCHARUM. PLUMBI ACETIS. PLUMBI ACETAS, (P. L. E. and D.) *Prep.* (P. L.) Oxide of lead in powder (litharge) lb. iv ℥ij; acetic acid and distilled water, of each 4 pints; mix the fluids, add the oxide, dissolve by a gentle heat, strain, evaporate, and crystallize. The Edinburgh form is similar.

II. (P. D.) Carbonate of lead 1 part; distilled vinegar 10 parts; as last.

Prop., Use, &c. Acetate of lead should be completely soluble in distilled water, and when the lead is exactly precipitated with dilute sulphuric acid, or by sulphureted hydrogen, the clear supernatant liquid should be wholly volatilized by heat without residue. Sulphuric acid poured on acetate of lead evolves acetic vapors. (P. L.) Its tests have been already noticed. Acetate of lead is powerfully astringent. *Dose.* ½ gr. to 2 grs., (Collier;) 1 or 2 grs. to 8 or 10 grs., twice or thrice a day, (Pereira;) 3 grs. to 10 grs. every 6 or 8 hours. (A. T. Thomson.) In pulmonary, uterine, and intestinal hæmorrhage, colliquative diarrhœa, and phthisical sweats. It is usually combined with morphia or opium, or with acetic acid, to prevent it passing into the state of the poisonous carbonate in the stomach. *Externally*, as a COLLYRIUM, 10 grs. to water 8 oz., (A. T. Thomson,) as a LOTION 20 grs., (A. T. Thomson,) ʒj (Collier) to water 8 oz.; as an INJECTION 40 grs. to rose water 8 oz. The lotion is cooling, and is commonly used in excoriations, &c. Acetate of lead is employed in calico printing.

Remarks. Acetate of lead is usually prepared on the large scale by gradually sprinkling oxide of lead into strong vinegar, heated in a copper boiler rendered negative-electric by having a large flat piece of lead soldered within it, constant stirring being employed until the acid is saturated, when the mother liquors of a former process may be added, the whole heated to the boiling point, allowed to settle till cold, decanted, evaporated to about the sp. gr. 1·266 or 1·267, and then run into salt-glazed stoneware vessels to crystallize. The best proportions are, finely powdered litharge 13 parts, and acetic acid sp. gr. 1·0482 to 1·0484, 23 parts. These ingredients should produce about 38½ parts of crystallized sugar of lead. A very slight excess of acid should be preserved in the liquid during the boiling and crystallization, to prevent the formation of any basic acetate, which would impede the formation of regular crystals.

SUBACETATE OF LEAD, (*Triacetate of Lead, Tersubacetate of Lead, Diacetate of Lead,*) is formed when a cold saturated solution of neutral

acetate of lead is mixed with one-tenth of its volume of liquor of ammonia, and set aside; anhydrous crystalline needles are deposited. A solution of this salt is formed when a solution of the neutral acetate is digested on finely powdered litharge, till the undissolved oxide turns white. By evaporation out of contact with air, small crystals may be obtained. Goulard's extract, and the liquor of diacetate of lead of the pharmacopœia, are solutions of this salt.

SESQUIBASIC ACETATE OF LEAD is prepared by gently fusing the neutral acetate of lead till it spontaneously forms a white porous mass. By solution in water, evaporation to a sirup, and cooling slowly, crystals may be obtained.

SEXBASIC ACETATE OF LEAD (*sexsubacetate of lead*) is a white crystalline precipitate, which forms when a solution of subacetate of lead is treated with liquor of ammonia. A hot saturated solution in water crystallizes on cooling. All the preceding acetates are soluble in water. The last two are neither employed in the arts nor in medicine.

LEAD, ARSENIATE OF. *Syn.* TRIARSENIATE OF LEAD. PLUMBI ARSENIAS. *Prep.* Gradually add a solution of acetate of lead to another of arseniate of soda. A white insoluble powder.

LEAD, BROMIDE. *Syn.* PLUMBI BROMIDUM. A white crystalline powder, sparingly soluble in water, formed by precipitating a solution of neutral acetate or nitrate of lead, with a solution of bromide of potassium. It fuses by heat into a red liquid, which turns yellow when cold.

LEAD, CHLORIDE OF. *Syn.* MURIATE OF LEAD. PATENT YELLOW. HORN LEAD. PLUMBI CORNEUM. PLUMBI MURIAS. PLUMBI CHLORIDUM, (P. L.) *Prep.* Precipitate a solution of ℥xix of acetate of lead in 3 pints of boiling distilled water, with a solution of ℥vj of chloride of sodium in 1 pint of boiling water; when cold wash and dry the precipitate, (P. L.)

Remarks. Employed in the preparation of muriate of morphia. It is totally dissolved by boiling water, the chloride concreting almost entirely into crystals as the solution cools. (P. L.)

LEAD, CHROMATE OF. In addition to the remarks on this article at page 192, it may be interesting to add that Anthon has found that when *hot* solutions of equal equivalents of acetate of lead (190 parts) and chromate of potash (100 parts, both neutral and in crystals) are mixed, the yellow precipitate when dried is *anhydrous;* but when the mixture is made at ordinary temperatures, the precipitate has a *paler* yellow, and when dried contains 1 eq., or nearly 5¼ per cent. of water. (Buch. *Rept.*) It thus appears that the shades of color of chrome yellow may be varied without any foreign addition.

LEAD DUST. *Syn.* PULVIS PLUMBI. By melting new lead, adding bruised charcoal, and diffusing the lead among it, then pounding and washing away the charcoal; used by potters.

LEAD, FLUORIDE. A white powder formed by precipitating a solution of neutral acetate of lead with hydrofluoric acid. It is very sparingly soluble in water.

LEAD, GRANULATED. By melting new lead, pouring it in small stream, from an iron ladle with a hole drilled in its bottom, into a pail of water. *Used* to make solutions and alloys.

LEAD, IODIDE OF. *Syn.* IODURET OF LEAD. PLUMBI IODIDUM, (P. L.) PLUMBI IODURETUM. *Prep.* I. (P. L.) Acetate of lead ℥ix water 6 pints; dissolve; iodide of potassium (pure) ℥vij; water 2 pints, dissolve. Add the latter solution to the former, wash and dry the precipitate.

II. (P. E.) Iodide of potassium and nitrate of lead, of each ℥j; dissolve each separately in ½ pint of water, mix, collect the precipitate in a calico or linen filter, and wash it with water; then boil it in 3 gallons of water, soured with pyroligneous (acetic) acid f℥iij, let the solution settle (still keeping the liquid near the boiling point,) and decant the clear; as the water cools, the iodide will subside in brilliant golden yellow lamellæ, or minute crystals.

Remarks. The latter is the best process, as any adhering oxide of lead is dissolved out by the acid. "It is totally dissolved by boiling water, and, as it cools, separates in shining yellow scales. It melts by heat, and the greater part is first dissipated in yellow, and afterwards in violet vapors." (P. L.) The residuum is quite soluble in nitric acid. "5 grs. of iodide of lead are entirely soluble (by boiling) in f3j of pyroligneous acid, diluted with f℥iss of water; and golden crystals are abundantly deposited as the solution cools." (P. E.) *Dose.* ½ gr. to 4 grs. or more, made into a pill, in enlargements of the cervical, axillary, and mesenteric glands, and in scrofulous affections and scirrhous tumors, as a deobstruent and resolvent. (See OINTMENT, IODIDE OF LEAD.)

LEAD, NITRATE OF. *Syn.* PLUMBI NITRAS. *Prep.* (P. E.) Litharge ℥ivss; diluted nitric acid 1 pint; dissolve by a gentle heat, and set the solution aside to crystallize. *Used* to make the *iodide of lead*, P. E.

LEAD, OXIDES OF. *Prep.* I. (*Dioxide. Suboxide. Gray oxide.*) Prepared by heating dry oxalate of lead to a low red in a glass tube out of contact with the air. Dark-gray, nearly black. It is also formed on the surface of metallic lead long exposed to the air.

II. (*Oxide. Protoxide. Yellow oxide.*) This oxide is prepared on the commercial scale by heating the gray film or dross that forms on the surface of melted lead exposed to the air, until it acquires a uniform yellow color, when it is called "*massicot;*" when the heat is still further increased until it fuses or partially vitrifies, the term "*litharge*" is applied to it. It is obtained perfectly pure by expelling the acid from nitrate of lead, by exposing it to heat in a platinum crucible; or, still better, by adding ammonia to a *cold* solution of nitrate of lead until the liquid becomes faintly alkaline, washing the precipitate with cold water, drying, and heating it to moderate redness for one hour, as above. Pure protoxide of lead has a lemon-yellow color, and is the base of all the salts of lead. It may be obtained in a crystalline state by exposing a concentrated solution of it in caustic soda to the air for some months, (M. Houton Labadilliere;) or, still easier, by mixing an aqueous solution of neutral acetate of lead with a great excess of liquor of ammonia, filtering, and exposing the liquid for a few hours in a well-corked bottle to the sun's rays. If the same solution be kept in the dark for some days, stellated crystals of basic acetate of lead, with five atoms of base, are deposited

instead of oxide. (W. Behrens.) See LITHARGE and MASSICOT.

III. (*Red oxide. Plumbeous suroxide. Red lead. Minium.*) See MINIUM.

IV. (*Sesquioxide.*) An insoluble reddish-yellow powder, formed by adding a solution of hypochlorite of soda to another of protoxide of lead in liquor of potassa. (Winkelblech.)

V. (*Peroxide. Puce oxide. Plumbic suroxide.*) Obtained by putting red lead into chlorine, or dilute nitric acid; or by fusing a mixture of protoxide of lead and chlorate of potassa, at a heat a little below redness, and washing the powdered mass in water; or by transmitting a current of chlorine gas through a solution of neutral acetate of lead.

LEAD, OXIDE, (HYDRATED.) *Syn.* PLUMBI OXYDUM HYDRATUM. *Prep.* (P. L.) Solution of diacetate of lead 6 pints; distilled water 3 gallons; mix, and add liquor of potassa as long as a precipitate forms, avoiding excess; wash well with water.

Remarks. This is *dihydrated oxide of lead.* (Mitscherlich.) It is used in preparing disulphate of quinine. It is totally soluble in dilute nitric acid, (P. L.,) and in an excess of liquor of potassa.

LEAD, OXY-IODIDE. Prepared by precipitating subacetate of lead by iodide of potassium.

LEAD, TANNATE. *Syn.* PLUMBI TANNAS. *Prep.* Precipitate a solution of acetate of lead with an infusion of galls; wash and dry the precipitate. Astringent. *Dose.* 1 gr. and upwards made into a pill.

*** Besides the preceding, various other preparations of lead have been formed by chemists, but possess little importance in a practical point of view. (See SALTS.)

LEECHES. *App.* Leeches are most conveniently applied by means of a common pill box or a wine-glass. The part should be previously washed perfectly clean, and if covered with hair should be closely shaved. Sometimes leeches will not readily bite: in such cases, allowing them to crawl over a piece of dry linen or calico, rolling them in porter, moistening the part with a little milk or sweetened milk, or drawing a little blood by a slight puncture or scratch, will usually make them bite freely. *To stop the bleeding from leech-bites*, various plans are adopted, among which cauterizing with nitrate of silver, the application of creosote, and gentle pressure for some hours, are most successful. (See MATTICO.)

Pres. Leeches are best preserved in water obtained from a pond, and occasionally changed; when kept in spring water they soon die. The introduction of a hand, to which an ill-flavored medicine or odor adheres, into the water in which they are kept, is often sufficient to poison them. The application of saline matter to the skin of leeches, even in very small quantities, immediately occasions the expulsion of the contents of the stomach: hence, a *few grains* of common salt are frequently sprinkled over them to make them disgorge the blood they have swallowed. According to Dr. Wagner, the taste of blood is necessary to render them fit for the purposes of reproduction. He recommends the employment of two tanks, with the bottom of loam, clay, or turf, surrounded by an inner border of a similar substance, and an outer one of sand. Two such tanks should be kept—the *one* for leeches fit for medical use,—and the other for *breeding*, or for such leeches as have been applied. No leeches are to be taken from the breeding tank until a year has elapsed after their having been applied and fed with human blood; and their removal to the first tank should take place in September or October, as by this time the breeding season is over. By this plan all leeches that have been applied are to be carefully restored to the breeding tank, without making them disgorge the blood they have swallowed. Leeches, to be able to grow and propagate, must, at least *once* a year, receive a plentiful supply of living blood. These conditions can only be fulfilled by restoring those that have been already employed. All artificial methods of feeding by bladders or sponges of blood have been found to fail. (Allgemeine Anzeiger der Deutschen.)

II. (J. R. Kenworthy.) Make pure clay, rendered plastic with water, into balls, or preferably, irregularly-shaped lumps, about 2½ inches in diameter; place them in a deep, square, wooden box, or a clean five-gallon keg. The leeches on being put in will creep down the sides of the balls, and there remain. No cover is necessary. Change the balls once a week. This method is simple and successful. (Ann. of Chym. and Pract. Phar.)

III. (Fee.) Lay 7 inches of a mixture of moss, turf, and charcoal in a marble or stone trough, over which place some small pebbles. At one end of the trough, and about half way up, place a thin shelf of stone or marble, pierced with small holes, on which put first some moss, or portions of the equisetum palustre, or horse tail, and on this a layer of pebbles to keep it down; then pour in water sufficiently high just to moisten the moss and pebbles, put in the leeches, and tie over the mouth of the trough with a cloth.

*** The frequent changing of the water in which leeches are kept is injudicious. Once a *month* in winter, and once a *week* in summer, is deemed sufficiently often by the large dealers, unless the water becomes discolored or bloody, when it should be changed every day, or every other day. *Clean pond water* is preferable; but where this cannot be got, clean rain water, that has been well exposed to the air, should alone be employed.

LEMON JUICE, ARTIFICIAL. *Syn.* SUCCUS LIMONUM FACTITIUS. *Prep.* I. Citric or tartaric acid 2¼ oz.; gum ½ oz.; pieces of fresh lemon peel ¼ oz.; loaf sugar 2 oz.; boiling water 1 quart; macerate with occasional agitation till cold, and strain. Excellent.

II. Water 1 pint; sugar 1 oz.; essence of lemon 30 drops; pure acetic acid to acidulate. Inferior. Both are used to make lemonade. (See GINGER BEER.)

LEMONADE. *Syn.* LEMON SHERBET. KING'S CUP. *Prep.* I. 2 lemons, sliced; sugar 2 oz.; boiling water 1 pint. Very fine.

II. White sugar 5 oz.; yellow peel of 1 lemon; water 1 quart; squeeze in the juice of 3 lemons, macerate 2 hours, and strain. Used as a pleasant cooling beverage and astringent drink in fevers and putrid diseases.

III. (*Lemonade for icing. Lemon Sherbet.*) Yellow peel of 3 or 4 lemons, rubbed off with hard sugar, as described at p. 199, (art. CITRONS;) loaf sugar 4 oz.; juice of 3 or 4 lemons; water 1 quart;

ice as wanted. ORANGEADE, or ORANGE SHERBET FOR ICING, is made in the same way with oranges.

LEMONADE, AERATED. *Syn.* LEMONADE GAZEUSE. LIMONADUM AERATUM. *Prep.* (P. Cod.) Water, charged with 5 times its volume of carbonic acid gas, 1 pint; sirup of lemon ℥ij; mix. Delicious.

LEMONADE, LACTIC. *Syn.* LIMONADUM LACTICUM. *Prep.* (Magendie.) Lactic acid ʒj to ʒiv; sirup ℥ij; water 1 pint; mix.

LEMONADE, PORTABLE. *Prep.* I. Tartaric or citric acid 1 oz.; finely-powdered loaf sugar ½ lb.; essence of lemon 20 drops; mix; 2 or 3 teaspoonfuls make a very pleasant glass of extemporaneous lemonade.

II. Powdered sugar 4 lbs.; citric or tartaric acid 1 oz.; essence of lemon 2 dr.; mix well. As last. Very sweet and agreeable.

LENSES. A description of these articles belongs to a work on optics. It may, however, be useful to the chemical student to remark, that the Coddington or Stanhope lenses, which may now be bought at any of the opticians, neatly mounted and of great power, for a few shillings, will be found of the greatest service in examining minute crystals, precipitates, &c.; and for all ordinary purposes offer a cheap and efficient substitute for more complicated microscopes.

LEROY'S VOMITIF-PURGATIF. *Prep.* Tartar emetic, in fine powder, ʒj; white wine ½ pint; sugar candy to color; dissolve, and label the bottle "*Vomitif.*" Next dissolve ʒvij of resin of jalap, in alcohol ½ pint; and label the bottle "*Purgatif.*" A popular nostrum in France, but its use requires caution.

LEUCIN. (From λευκος, *white.*) M. Braconnot has given this name to a white pulverulent substance, obtained by the action of dilute sulphuric acid on muscular fibre. It combines with nitric acid, forming *nitro-leucic acid.*

LEVIGATION. *Syn.* LEVIGATIO, (*Lat.*, from *lævigo*, to make smooth.) The process of reducing substances to *fine* powder, by making them into a paste with water, and grinding the mass upon a hard smooth stone or slab, with a conical piece of stone having a flat, smooth under-surface, called a "*muller.*" Levigation is resorted to in the preparation of paints on the small scale, and in the elutriation of powders.

LICHENIC ACID. A variety of malic acid found in some species of lichens.

LICHENIN. A species of starch extracted from Iceland moss. (*Citraria Islandica.*)

LICHEN GUM. A strained infusion or decoction of several species of lichen, evaporated to dryness. It resembles gum arabic: 1 cwt. of lichen coralloides yields 14 lbs.; lichen esculentus, about 13 lbs. (Gray.)

LIGHT, INSTANTANEOUS. (See CHLORATE MATCHES, CONGREVES, LUCIFERS, &c.)

LIGNINE. Pure woody fibre. It forms about 95§ of baked wood, and constitutes the woody portion of all vegetables; its composition resembles starch, and by the action of oil of vitriol it is converted into dextrine, or sugar, and a new acid, (*ligno-sulphuric acid.*) Strong nitric acid dissolves sawdust, and when the solution is diluted with water, a white insoluble powder is deposited, which explodes when heated. (Robiquet.)

LIGNONE. A light inflammable fluid, obtained with other products during the destructive distillation of wood. It is a mixture of pyroxilic spirit and acetate of methule. (Berzelius.)

LILACINE. *Prep.* (M. Meillet.) The leaves, or, preferably, the seed vessels, of syringa vulgaris, are bruised, boiled twice with water, the decoction is evaporated to one half, basic acetate of lead added, the liquor evaporated to a sirup, and treated with calcined magnesia in excess; the whole is then dried, pulverized along with a little carbonate of magnesia, digested in water at from 86° to 104°, and the undissolved portion treated with boiling alcohol, sp. gr. 0·8295. The solution thus obtained is decolored with animal charcoal, filtered, evaporated to one half, and placed aside; the lilacine crystallizes out as the spirit cools. Lilacine forms white fasciculi of acicular crystals, or prisms; it has a bitter taste, and is insoluble in water and many acids. (Jour. de Pharm., 1842, p. 25.)

LIME. *Syn.* OXIDE OF CALCIUM. CALX, CALX VIVA, CALX RECENS USTA, (*Lat.*, from *kalah*, Arabic, *to burn.*) An oxide of calcium, obtained by exposing limestone or chalk, which are carbonates of lime, to a red heat. The substance thus obtained is called "*quicklime,*" or "*stone lime.*" When water is sprinkled on quicklime it becomes very hot, and crumbles down into a dry white powder, which is "*hydrate of lime,*" popularly known as "*slaked*" or "*slacked lime.*" Oyster-shells, and other fish shells, are also converted into quicklime by burning, which is then called "*shell-lime,*" (calx è testis.) *Milk of lime* is slaked lime mixed up with water.

Prop. Pure lime has a sp. gr. of about 2·3, and is soluble in 635 parts of water at 32°, but requires 778 parts at 60°, 972 parts at 130, and 1270 parts at 212°, for its solution. (Wollaston.) A pint of water at 32° dissolves 13·25 grs.; at 60°, 11·6 grs; and at 212°, 6·7 grs. (Phillips.) Hence will be seen the propriety of employing cold water for the solution of lime. Its aqueous solution is caustic and alkaline. When strongly heated, lime becomes phosphorescent, and emits a brilliant light; and on this account is sometimes employed for illumination, as in the Gurney, or Lime Light.

Lime readily unites with the acids, and forms salts, nearly all of which may be made by directly neutralizing the acid with the hydrate or carbonate (chalk) of lime. They may also be made by double decomposition.

Tests. 1. The alkaline carbonates, phosphates, oxalates, and sulphates, occasion white precipitates in solutions of lime. The precipitates occasioned by the first three tests are soluble in dilute nitric or muriatic acid; that by the last is insoluble in those menstrua, but soluble in solution of salt, and not reprecipitated by dilute sulphuric acid. (Wackenroder.) Oxalate of ammonia or potassa is the most delicate test of lime. If the substance under examination be a solid, dissolve it in muriatic acid, filter, evaporate to dryness, redissolve in water, and test as above. All the soluble salts of lime tinge the flame of alcohol of an orange color.

Uses. Lime is corrosive, antacid, and depilatory. It is employed to make lime water; to render the alkalis caustic, and to make several calcareous salts. It is largely used to make mortars

Separate the heavier liquid that distils over, agitate it with water, and rectify it along with caustic potassa, in an atmosphere of carbonic acid. By a second rectification over lime or baryta it may be obtained anhydrous. A colorless liquid, boiling at 300°, congealing at —10° F., and evolving a very offensive odor, resembling arseniuretted hydrogen. "It is *highly poisonous* in every shape." It possesses feeble basic properties, is soluble in alcohol and ether, sparingly soluble in water, and inflames spontaneously by exposure to the air.—SULPHURET OF KADODULE is formed by distilling a mixture of chloride of kadodule and hydrosulphuret of sulphuret of barium; a colorless fetid liquid, heavier than water, and very poisonous.—CYANIDE OF KADODULE is obtained by distilling a concentrated solution of bicyanide of mercury, along with alkarsine; fusible, volatile crystals.—CHLORIDE OF KADODULE is prepared by distilling alkarsine and bichloride of mercury; a colorless liquid, depositing crystals of *oxychloride of kadodule*, when exposed to the atmosphere.—IODIDE, BROMIDE, and FLUORIDE OF KADODULE resemble the last, and are prepared in a similar manner.—KADODYLIC ACID (*Alkargen*) is obtained when alkarsine is *gradually* exposed to the air, in the *cold*. As soon as a semi-solid mass is formed, it must be treated with *cold* water, the solution evaporated till it solidifies, and then pressed in bibulous paper, to remove *hydrarsine;* the residuum is dissolved in boiling absolute alcohol, and is again obtained in crystals as the liquid cools; by repeating the process several times with alcohol, or by evaporating the aqueous solution in a water-bath, and subsequent treatment with hydrated peroxide of iron, and a final crystallization from alcohol, pure *kadodylic acid* is obtained. Brittle, glossy, prismatic crystals, deliquescent, inodorous, tasteless, and soluble in water and alcohol.

*** All the preparations of kadodule are *exceedingly poisonous*, and therefore great caution should be exercised in experimenting on them. Even *very small* quantities of their vapors cause vomiting, numbness of the extremities, fainting, and other alarming symptoms. They all evolve a most offensive odor, and this property has led Bunsen to propose the following *test for arsenic and the acetates*:—A metallic sublimate boiled with water containing air until dissolved, the solution mixed with potash and acetic acid, evaporated to dryness, and the residuum heated in a test tube, wi evolve the horrible odors of alkarsine, if arsenic be present. This odor is rendered even more offensive by the addition of protochloride of tin to the ignited mass. As a test for the acetates, the addition of potassa and arsenic must be added. (Vide Turner's Chem., 7th ed., and also the Researches of Berzelius, and the more recent ones of Bunsen.)

KALEIDOSCOPE. (From καλος, *pretty;* ειδος, *form;* and σκοπεω, *I view.*) A pleasing, philosophical toy, invented by Sir David Brewster, which presents to the eye a series of symmetrical changing views. It is formed as follows:—Two slips of silvered glass, from 6 to 10 inches long, and from an inch to an inch and a half wide, and rather narrower at one end than the other, are joined together lengthwise, by one of their edges, by means of a piece of silk or cloth, glued on their backs; they are then placed in a tube (tin or pasteboard) blackened inside, and a little longer than is necessary to contain them, and are fixed, by means of small pieces of cork, with their faces at any angle to each other, that is an even aliquot part of 4 right angles, (as the one-sixth, one-eighth, one-tenth, &c.) The one end of the tube is then closed with an opaque screen, or cover, through which a small eyehole is made in the centre, and the other end fitted, first with a plate of common glass, and at the distance of about ⅛ of an inch, with a plain piece of slightly *ground* glass, parallel to the former; in the intermediate space or cell are placed the objects to form the images. These consist of colored pieces of glass, glass beads, or any other colored diaphonous bodies, sufficiently small to move freely in the cell, and to assume new positions when the tube is shaken or turned round. A tube so prepared presents an infinite number of changing and symmetrical pictures, no one of which can be *exactly* reproduced. This toy is easily constructed, and is very inexpensive; as any common tube of tin or pasteboard may be used, and strips of glass smoked on one side will answer for mirrors. Kaleidoscopes are commonly called *flower-glasses.*

KERMES MINERAL. *Syn.* KERMES MINERALIS. *Prep.* I. Black sesquisulphuret of antimony 4 lbs.; carbonate of potash 1 lb.; boil in water 2 gallons, for half an hour, filter, and cool slowly; the kermes will be deposited as the solution cools, and must be washed with water and dried. The undissolved portion of sesquisulphuret of antimony may be boiled again several times with fresh potash and water. The liquor decanted off the kermes will yield the GOLDEN SULPHURET OF ANTIMONY, on the addition of an acid; the acetic being generally used for this purpose.

II. Sesquisulphuret of antimony 1 lb.; carbonate of potash ½ lb.; flowers of sulphur 1 oz.; mix, melt, cool, powder, boil in water q. s.; filter while hot; the kermes is deposited as the liquid cools, and must be well washed with water.

III. (*Cluzell's kermes.*) Sulphuret of antimony 4 parts; crystallized carbonate of soda 90 parts; water 1000 parts; boil for 30 to 45 minutes, filter while hot into a warm vessel, and cool very slowly; in 24 hours collect the kermes, moderately wash with cold water, and dry at 70 or 80° F., folded up in paper, to exclude the air and light.

Remarks. The first two formulæ yield an orange-red powder; the third a very dark crimson powder, of a smooth velvety appearance. It is a *hydrated oxysulphuret of antimony*, (Gay Lussac;) *a hydrated sesquisulphuret*, (Berzelius.) *Dose.* ½ gr. to 4 grs. as a diaphoretic, cathartic, or emetic. It occupies in foreign practice the place of our James's Powder.

KETCHUP. *Syn.* CATSUP. KATCHUP. *Prep.* I. (*Camp ketchup.*) Old strong beer 2 quarts; white wine 1 quart; anchovies 4 oz.; mix, boil for 10 minutes, remove it from the fire, and add of peeled shalotes 3 oz.; mace, nutmegs, ginger, and black pepper, of each ½ oz.; macerate for 14 days and bottle.

II. (*Cucumber ketchup.*) From ripe cucumbers, in the same way as mushroom ketchup. Mixed with cream, or melted butter, it forms an excellent *white sauce* for fowls, &c.

III. (*For sea stores.*) Stale strong beer 1 gal-

n; anchovies 1½ lbs.; peeled shalotes 1 lb.; ruised mace, mustard seed, and cloves, of each oz.; bruised pepper and ginger, of each ¼ oz.; mushroom ketchup and vinegar, of each 1 quart; heat to the boiling point, put it into a bottle, cork, nd macerate for 14 days, frequently shaking; hen strain through flannel, and bottle for use. This, like the last, makes good white sauce, and eeps well.

IV. (*Mushroom ketchup.*)—*a.* Sprinkle mushroom flaps, gathered in September, with common alt, stir them occasionally for 2 or 3 days, then ghtly squeeze out the juice, and add to each gallon, bruised cloves and mustard seed, of each ½ z.; bruised allspice, black pepper, and ginger, of each 1 oz.; gently heat to the boiling point in a overed vessel, macerate for 14 days, and strain; hould it exhibit any indications of change in a w weeks, bring it again to the boiling point, with little more spice.—*b.* Mushroom juice 2 gallons; imento 2 oz.; cloves, black pepper, mustard seed, nd ginger, of each, bruised, 1 oz.; salt 1 lb., or to aste; shalotes 3 oz.; gently simmer for 1 hour in covered vessel, cool, strain, and bottle.—*c.* Juice 00 gallons; black pepper 9 lbs.; allspice 7 lbs.; inger 5 lbs.; cloves 1 lb.; salt as required; all ruised; gently simmer in a covered tin boiler for hour. *** A glazed earthenware, or *well-tinned* copper pan, should alone be used for heating his or any other ketchup in, as the salt and juice apidly corrode the copper, and render the ketchup *oisonous.*

V. (*Oyster ketchup.*) Pulp the fish, and to ach pint add sherry wine, or very strong old ale, pint; salt 1 oz.; mace ½ oz.; black pepper 1 dr.; oil 10 minutes, strain, cool, bottle, and to each ottle add a spoonful or two of brandy. Cockle Ketchup and Mussel Ketchup are made in the ame way. Used to flavor sauces when the fish re out of season.

VI. (*Pontac ketchup.*) Elderberry juice and trong vinegar, of each 1 pint; anchovies ½ lb.; halote and spice to flavor; boil for 5 minutes, cool, train, and bottle. Used to make fish sauce.

VII. (*Tomato ketchup.*) Prepared like mushroom ketchup, except that a little Chili vinegar is ommonly added.

VIII. (*Walnut ketchup.*)—*a.* Expressed juice f young walnuts, when tender, 1 gallon; boil, kim, add anchovies 2 lbs.; shalotes 1 lb.; cloves nd mace, of each 1 oz.; 1 clove of garlic, sliced; immer in a covered vessel for 15 minutes, strain, ool, and bottle, adding a little fresh spice to each ottle, and salt as required. Will keep in a cool lace for 20 years.—*b.* Green walnut shells 16 gallons; salt 4 lbs.; mix, and beat together for a week, ress out the liquor, and to every gallon add allpice 4 oz.; ginger 3 oz.; pepper and cloves, of ach 2 oz.; all bruised; simmer for half an hour.—. Walnut-juice 1 gallon; vinegar 1 quart; British anchovies (sprats) 3 or 4 lbs.; pimento 3 oz.; inger ½ oz.; long pepper ½ oz.; cloves 1 oz.; halotes 2 oz.; boil and bottle.—*d.* Juice of walnut hells 30 gallons; salt 1 bushel; allspice and shalotes, of each 6 lbs.; ginger, garlic, and horseradish, of each 3 lbs.; essence of anchovies 3 gallons; simmer as before.

IX. (*Wine ketchup.*) Mushroom or walnut etchup 1 quart; chopped anchovies ½ lb.; 20 shalotes; scraped horseradish 2 oz.; spice as usual, simmer for 15 minutes; cool, add white and red wine, of each 1 pint; macerate for 1 week, strain and bottle.

KINIC ACID. Discovered by Hoffman in cinchona bark, in 1790. It may be obtained from *kinate of lime*, by the action of dilute sulphuric acid, filtration, and evaporation, to the consistence of a sirup, when crystals will be gradually deposited. It is soluble in water and alcohol, and forms salts called Kinates. *Kinate of lime* is obtained from an acidulated infusion of cinchona bark, by adding an excess of lime, filtering, evaporating to a sirup, and setting the liquid aside, when crystals will form.

KING'S YELLOW. *Syn.* Hartal. Sesquisulphuret of Arsenic. A beautiful golden yellow pigment, prepared from orpiment by sublimation. The finest kind is imported from China, Japan, and Burmah. See Arsenic.

KINO, FACTITIOUS. Logwood 48 lbs.; tormentil root 16 lbs.; madder root 12 lbs.; water q. s.; make a decoction; add catechu 16 lbs.; dissolve, strain, and evaporate to dryness. *Prod.* 24 lbs. Extract of mahogany is also commonly sold for kino.

KIRCHWASSER. *Syn.* Kirschenwasser. A spirituous liquor distilled in Germany from bruised cherries. From the rude manner in which it is obtained, and from the distillation of the cherry-stones (which contain prussic acid) with the liquor, it usually has a very nauseous taste, and is frequently *poisonous.*

KŒCHLIN'S LIQUID. *Prep.* Copper filings 96 grs.; liquor of ammonia ℥ij; digest till the liquor turns of a full blue, filter, add muriatic acid ℨv 12 grs.; distilled water 5 lbs.; mix. *Dose.* 1 to 2 teaspoonfuls daily in scrofula.

KOMENIC ACID. A peculiar acid discovered by Robiquet, and most easily obtained by boiling meconic acid with strong muriatic acid. It forms crystalline grains, and strikes a blood-red color with the persalts of iron. With the basis it forms salts called Komenates.

KOUMISS. A liquor prepared by the Calmucs, by fermenting mare's milk, previously kept till sour, and then skimmed. By distillation it yields a spirit called *rack*, *racky*, or *araka;* 21 lbs. of fermented milk yield about ¾ of a pint of low wines, and this, by rectification, fully ¼ of a pint of strong alcohol.

KRAMERIC ACID. A peculiar substance found by M. Peschier, of Geneva, in rhatany root, (Krameria triandria,) and to which he ascribes its stypticity.

KUSTITIEN'S METAL. *Prep.* Malleable iron 1 lb.; heat to whiteness, and add of antimony 5 oz.; Molucca tin 24 lbs.; mix under charcoal, and cool. Used to tin iron and other metals; it polishes without a blue tint, is hard, and is free from lead and arsenic.

LABDANUM, FACTITIOUS. *Prep.* I. Gums anime, copal, lac, and mastich, of each 2 lbs.; gum arabic 3 lbs.; catechu and common Spanish juice, of each 1 lb.; sirup of tolu 8 oz.; essences of ambergris and musk, of each 2 oz. melt together.

vessels are now filled with old scraps of iron, and the upper one with pyroligneous acid; after half an hour this is drawn off into the vessel next below it, and this again, after the lapse of another half hour, into the *third*, and so on until the last is emptied. The acid is now passed a second time through the vessels in the same way as before, and thus becomes more strongly impregnated with iron in a less time than by *any other* means, except the following:—

b. (Dr. Winterfield.) This consists in employing several wooden cylinders, resembling those used in the quick process of making vinegar; the space between the two perforated bottoms, usually filled with wood shavings, being occupied with scraps of iron. Pyroligneous acid is then passed through them, and the same system of ventilation observed as in the manufacture of vinegar. (Gewerbe-Blatt f. Sachsen.)

c. Leave old scraps of iron in a cask of vinegar, or pyroligneous acid, and employ occasional agitation, until a sufficiently strong solution is obtained. When the deposite of tar on the iron hinders the solution, it may be burnt off.

d. Add a solution of acetate of lime to another of green copperas, as long as a precipitate is formed; decant.

III. (*Protacetate.*) Dissolve freshly precipitated protoxide or carbonate of iron in acetic acid, or add a solution of acetate of lime to another of protosulphate of iron, and evaporate out of contact with the air. Small green prismatic crystals.

IV. (*Sesquiacetate. Peracetate.*) Dissolve hydrated peroxide of iron in acetic acid, or precipitate a solution of acetate of baryta by another of persulphate of iron. Uncrystallizable.

Remarks. All the above, prepared with crude materials, are used as mordants by the dyers.

IRON, ARSENITE OF. *Prep.* I. (*Protarsenite. Ferri arsenias.*) Precipitate a solution of protosulphate of iron with another of arsenite of soda or ammonia; wash and dry. A yellowish brown powder, used in medicine as a tonic, alterative, and febrifuge.

II. (*Perarsenite. Sesquiarsenite.*) Prepared by precipitating peracetate of iron with arsenite of ammonia, or by boiling nitric acid on the protarsenite.

Remarks. The *arseniates* of the iron may be formed in a similar way, from the arseniate of soda or ammonia.

IRON, ALBUMINATE. *Prep.* I. (Lassaigne.) Precipitate a filtered solution of white of egg with another of persulphate of iron, wash the deposite in water, and dissolve it in alcohol, holding caustic potassa in solution.

II. (Cooley.) Dissolve well washed hydrated protoxide or peroxide of iron in white of egg, diluted with twice its weight of water, and filtered.

Remarks. As a therapeutic agent, the albuminate of iron is highly spoken of by M. Lassaigne and other high authorities, who recommend it as a preparation especially adapted by its nature, on theoretical grounds, for combining with the tissues of the body. It will no doubt, ere long, take a prominent situation among the most esteemed of our chalybeates.

IRON, AMMONIO-CHLORIDE OF. *Syn.* FERRO-CHLORIDE OF AMMONIA. AMMONIATED IRON. ENS VENERIS BOYLEI. ENS MARTIS, (P. L. 1720.) FLORES MARTIALES, (P. L. 1775.) FERRUM AMMONIACALE, (P. L. 1788.) FERRUM AMMONIATUM, (P. L. 1809 and 1824.) FERRI AMMONIO-CHLORIDUM, (P. L. 1836.) FLORES SALIS AMMONIACI MARTIALIS. MURIAS FERRI ET AMMONIÆ. *Prep.* I. (P. L.) Sesquioxide of iron ℥iij; muriatic acid ½ pint; digest in a proper vessel in a sand-bath for 2 hours, then add sal ammonia lb. iiss, dissolved in water 3 pints; filter, evaporate to dryness, and reduce the mass to coarse powder. Orange-colored crystalline grains.

II. Rub sal ammoniac with twice its weight of colcother or rust of iron, sublime with a quick sudden heat, and repeat the sublimation with fresh sal ammoniac as long as the flowers are well colored. Difficult to manage.

Remarks. Ammonio-chloride of iron "is totally soluble in proof spirit and in water. Potassa added to the solution throws down sesquioxide of iron, and when added in excess, evolves ammonia." (P. L.) Tonic. Emmenagogue and aperient. *Dose.* 5 to 15 grs. in glandular swellings, obstructions, &c.

IRON, AMMONIO-TARTRATE OF. *Syn* AIKIN'S AMMONIO-TARTRATE OF IRON. TARTRATE OF IRON AND AMMONIA. FERRO-TARTRATE OF AMMONIA. AMMONIÆ FERRO-TARTRAS, &c. *Prep.* Tartaric acid 1 part; iron filings 3 parts; digest in a sufficient quantity of hot water to barely cover the mixture for 2 or 3 days, observing to stir it frequently, and to add just enough water to allow the evolved gas to escape freely; then add some liquor of ammonia, and continue the stirring; dilute with water, decant, wash the undissolved portion of iron, filter the mixed liquors, and evaporate to dryness; redissolve in water, add a little more ammonia, filter, and again gently evaporate to dryness, or to the consistence of a thick sirup, when it may be spread upon hot plates of glass, or on earthenware dishes, and dried in a stove-room, as directed for citrate of iron.

Remarks. Glossy, brittle lamellæ, or irregular pieces, deep garnet-colored, almost black, very soluble in water, and possessing a sweetish and slightly ferruginous taste. By repeated re-solution and evaporation its sweetness is increased, probably from the conversion of a part of its acid into sugar. It contains more iron than a given weight of the sulphate of the same base. It is the most pleasant-tasted of all the preparations of iron, except the ammonio-citrate. (Aikin, Lond. Med. Gaz.)

IRON, BENZOATES OF. Prepared by digesting the hydrated oxides in a hot solution of the acid, or from the benzoate of an alkali and a salt of iron by double decomposition.

IRON, BRONZING OF. (See BROWNING OF GUN BARRELS, and BRONZING.)

IRON, CARBONATE OF. *Syn.* FERRI CARBONAS. This preparation is found in a crystallized state in the mineral called *Spathose iron*, and in some chalybeate waters.

Prep. Precipitate protosulphate of iron by adding a solution of carbonate of soda, well wash the green powder with water and dry it out of contact with the air. On the slightest exposure it is converted into *sesquioxide of iron.*

IRON, CARBONATE, (SACCHARINE.) *Syn.* Klauer's Ferrum carbonicum saccharatum. Ferri Carbonas saccharatum. *Prep.* (P. E.) Sulphate of iron ℥iv; carbonate of soda ℥v; dissolve each separately in water 1 quart, mix the solutions, collect the precipitate, well wash it with cold water, drain on a cloth, squeeze out as much of the water as possible, and add powdered lump sugar ℥ij; mix and dry at a temperature not much above 120° F. The whole operation should be performed as quickly as possible. A sweet-tasted greenish mass or powder, consisting chiefly of carbonate of iron. It is one of the best of the chalybeates. *Dose.* 5 to 10 grs. When pure it should be "easily soluble in muriatic acid with brisk effervescence." (P. E.)

IRON, CHLORIDE OF. *Syn.* Ferri Chloridum. *Prep.* I. (*Protochloride.*) Dissolve iron filings or scales in muriatic acid, evaporate and crystallize. Soluble, green crystals.

II. (*Perchloride. Sesquichloride.*) Dissolve sesquioxide or rust of iron in muriatic acid, evaporate to the consistence of a sirup, and crystallize. Red crystals.

Remarks. Neither of the preceding is absolutely pure; but by transmitting dry hydrochloric acid gas over iron heated to redness, a pure white crystalline protochloride of iron is obtained; and by the combustion of iron wire in chlorine gas, or by passing chlorine over heated iron, the pure perchloride of iron is formed. The *protochloride* is volatile at high temperatures, and the *perchloride* is dissipated by a heat a little above 212° F. The latter is soluble in water, alcohol, and ether, and is deliquescent. (See Tinct. of Sesquichloride of Iron.)

IRON, IODIDES OF. *Prep.* I. (*Protiodide of Iron. Iodide of do. Ioduret of do. Ferri Iodidum,* P. L. *Ferri Ioduretum.*) *a.* (P. L.) Iodine ℥vj; iron filings ℥ij; water 4½ pints; mix, boil in a sand-bath until the liquid turns to a pale green, filter, wash the residue with a little water, and evaporate the mixed liquors in an iron vessel, at 212°, to dryness.

b. (P. E.) The Scotch college orders the solution not to be filtered until evaporated to ⅛, without removing the excess of iron, and then to be filtered as quickly as possible and put into a basin, which must be surrounded with 12 times its weight of quicklime, and placed in some convenient apparatus in which it may be accurately shut in a small space not communicating with the general atmosphere. The whole must then be heated in a hot-air press, in a stove or otherwise, until the water be entirely evaporated, when the iodide of iron must be put into small dry-stoppered vials. *Product excellent.*

Remarks. A great deal has been written and said about the preparation of iodide of iron, much of which is more amusing than instructive. There is in reality very little difficulty in the process. As soon as iodine and iron are mixed together under water, much heat is evolved, and if too much water be not used the combination is soon completed, and the liquor merely requires to be evaporated to dryness, out of contact with the air, at a heat not exceeding 212°. This is most cheaply and easily performed by employing a glass flask, with a thin broad bottom and a narrow mouth, by which means the evolved steam will exclude air from the vessel. I have adopted the following formula with excellent results:—Iodine 18 oz.; iron wire or filings 6 or 7 oz.; water about 1 quart; mix in a glass or stoneware jug, agitate with an iron rod, (cautiously;) when the temperature of the liquid will rise considerably, and the combination be completed in 20 or 30 minutes, without the application of external heat. When the liquor assumes a pale green color, decant it into a glass flask with a thin bottom, wash the remaining iron with a little water, filter, and add it to that already in the flask. Apply the heat of a sand-bath, or a rose gas jet, (preferably the former,) and evaporate to the consistence of a sirup as quickly as possible, then remove the flask into a water-bath containing ⅕ salt and evaporate to dryness, observing not to stir the mass during the latter part of the process. The whole of the uncombined water may be known to be evaporated when vapor ceases to condense on a piece of cold glass held over the mouth of the flask; a piece of moistened starch paper occasionally applied in the same way, will indicate whether free iodine be evolved; should such be the case, the heat should be immediately lessened. When the evaporation is completed, the mouth of the flask should be stopped up by laying a piece of sheet Indian rubber on it, and over that a flat weight; the flask must be then removed, and when cold broken to pieces, the iodide weighed, and put into dry and warm stoppered wide-mouth glass vials, which must be immediately closed, tied over with bladder, and the stoppers dipped into melted wax.

Iodide of iron "evolves violet vapors by heat, and sesquioxide of iron remains. When freshly made it is totally soluble in water, and from this solution when kept in a badly stoppered vessel, sesquioxide of iron is very soon precipitated; but with iron wire immersed in it, it may be kept clear in a well-stoppered vessel." (P. L.) "Entirely soluble in water, or *nearly* so, forming a greenish solution." (P. E.) Its *dilute* solution should be colorless. (A. J. C.)

Dose. 1 to 3 grs. or more. It is tonic, stimulant, and resolvent, and has been given with advantage in debility, scrofula, and various glandular affections.

II. (*Periodide.*) Freely expose a solution of protiodide of iron to the air; or digest iodine in excess on iron under water, gently evaporate, and sublime. A deliquescent, volatile red compound, soluble in water and alcohol.

IRON, LACTATE. *Syn.* Protolactate of Iron. Ferri lactas. *Prep.* I. (Rassman.) Boil iron filings in lactic acid diluted with water till gas ceases to be evolved, filter while hot into a suitable vessel, which must then be closely stopped; as the solution cools, crystals will be deposited, and these must be washed with a little cold water, then with alcohol, and lastly dried. The mother-liquor digested as before with fresh iron will yield more crystals. (Buchner's Rep.)

II. (Pagenstecher.) Lactate of lime prepared from sour milk is dissolved in water, and carbonate of ammonia added till it ceases to produce a precipitate; the liquid is now filtered, and concentrated by heat till it acquires the consistence of a sirup; it is then mixed with 6 times its weight of

gamboge in equal parts of proof spirit and water. Golden colored.—*c.* Steep French berries in hot water, strain, and add a little gum and alum.—*d.* Steep turmeric, round zedoary, gamboge, or annotto, in spirits of wine.—*e.* Dissolve annotto in a weak lye of subcarbonate of soda or potash. All the above are used by artificial florists.

V. (*Red.*) *a.* Macerate ground Brazil in vinegar, boil a few minutes, strain, and add a little alum and gum.—*b.* Add vinegar to an infusion of litmus till it turns red.—*c.* Boil or infuse powdered cochineal in water; strain, and add a little alum and gum.—*d.* Dissolve carmine in liquor of ammonia, or in weak carbonate of potash water; the former is superb.

Remarks. All the preceding, thickened with a little gum, are used as inks for writing, as colors to tint maps, foils, paper, artificial flowers, &c., and to paint on velvet. Some of them are very beautiful. It must be observed, however, that those made with *strong* spirit do not mix well with gum, unless diluted with water.

LIQUID COLORS, (*for druggists' show-bottles.*) *Prep.* I. (*Blue.*) *a.* Blue vitriol 1 lb.; water 1 gallon; dissolve.—*b.* To the last add alum 1 lb., and oil of vitriol to strike the color. Very dark.—*c.* Dissolve indigo in sulphuric acid, and dilute with water.—*d.* Dissolve *pure* Prussian blue in oxalic or muriatic acid, and dilute with water. (See Blue Inks and Writing-Fluids.)

II. (*Purple.*) *a.* Verdigris 1 oz.; spirits of hartshorn 1 lb.; water 6 lbs.; dissolve.—*b.* Infusion of logwood 1 gallon; spirits of hartshorn q. s.—*c.* Sugar of lead 3 oz.; powdered cochineal 1 dr.; water q. s.—*d.* Add sulphate of indigo, nearly neutralized with chalk, to an infusion of cochineal, till it turns purple.

III. (*Green.*) *a.* Verdigris 4 oz.; water 2 quarts; mix, and add oil of vitriol or nitric acid q. s.—*b.* Crystallized verdigris 4 oz.; strong vinegar ½ pint; dissolve, and dilute with water.—*c.* Add distilled verdigris and blue vitriol to a strong decoction of turmeric.—*d.* Dissolve blue vitriol in water, and add nitric acid till it turns green.

IV. (*Red.*) *a.* Dissolve carmine in liquor of ammonia, and dilute with water.—*b.* Digest powdered cochineal in spirits of hartshorn or solution of sal ammoniac; and when colored, dilute with water.

V. (*Yellow.*) *a.* Sesquioxide or rust of iron ½ lb.; muriatic acid 1 quart; dissolve and dilute with water.—*b.* To a strong decoction of French berries add a little alum.—*c.* Dissolve gamboge or annotto in liquor of potassa; dilute with water, and add a little spirit. Orange or deep orange, depending on the quantity of alkali present.

Remarks. All the above require filtering through paper placed in a glass funnel, and usually need a second filtration after being exposed to the light for some weeks.

LIQUID, SHAVING. *Syn.* Liquid Soap. *Prep.* Best soft soap 1 lb.; rectified spirit of wine 1¼ pint; mix. *Used* to raise a lather in shaving, by merely rubbing a few drops on the beard, and applying a little hot water with the finger or shaving-brush. Stronger than the *esprit de savon* and *essence royal pour la barbe,* sold for the same purpose. Some persons substitute proof spirit for spirit of wine, and others use equal parts of water and spirit of wine as the menstruum. All answer well.

LIQUODILLA. *Prep.* Yellow peel of 6 oranges and 6 lemons; brandy or plain spirit 1 gallon; digest a week, filter, and add loaf sugar 4 lbs., dissolved in water 1 gallon, and the juice of the oranges and lemons which were peeled. Let it stand a month, and then bottle. A pleasant and refreshing cordial.

LIQUOR. *Syn.* Liqueur, (*Fr*) Liquor, (*Lat.*, from *liqueo*, I become liquid.) This term is applied in the London Pharmacopœia to those aqueous solutions commonly, though improperly, called waters; as, liquor of ammonia, (*liquor ammoniæ,*) liquor of potassa, (*liquor potassæ,*) &c., which are simple solutions of pure potassa and gaseous ammonia, and would therefore be more correctly and intelligibly called "solutions." (See Solution.)

The term "*liquor*" has also been applied of late years to some concentrated preparations, more correctly termed "*fluid extracts,*" as they merely differ from *good* extracts in their less consistence, and from *ordinary* extracts in containing less starchy matter, albumen, and gum. There is also usually a little spirit added to them, to prevent decomposition. Liquors of this kind may be made of the finest quality, by the same processes that are required for the preparation of good soluble extracts; observing to stop the evaporation as soon as the consistence of treacle is acquired, and when cold, to add 1-4th or 1-5th part of their then weight in rectified spirit of wine. The addition of 3 or 4 drops of the oils of cloves and mustard seed, dissolved in the spirit, will secure them from any risk of moulding or fermentation; in fact, with this addition many of them will keep well without spirit, provided they be evaporated sufficiently, and kept in a cool place. The liquors which are merely concentrated infusions or decoctions, and which in their consistence do not even approximate to extracts, may be made in the same manner as these preparations. (See Infusions and Decoctions, concentrated, and Essences.) The following formulæ are introduced to illustrate the preparation of this class of medicines:—

LIQUOR OF PALE CINCHONA. *Syn.* Liquor Cinchonæ pallidæ. *Prep.* I. Pale cinchona bark, bruised, 56 lbs.; boiling water, holding in solution 1 lb. of sulphuric acid, q. s.; macerate, with occasional agitation in a covered earthen vessel for 48 hours; press out the liquid, wash the residue with water, mix the liquors, strain, evaporate as rapidly as possible in earthenware, to exactly 6 lbs.; add rectified spirit 1 lb.; set it aside for a week, and decant the clear. Very rich in cinchona. It is 96 times as strong as the decoction of cinchona, P. L., and 12 times as strong as the concentrated infusion or decoction of cinchona. This preparation resembles the liquor cinchonæ pallidæ sold by Battley, at 24*s.* per lb., wholesale.

II. Exhaust the bark as above, by maceration in 3 successive waters without acid, filter, evaporate the mixed liquors to 7 lbs., and proceed as before. Inferior to the last, and less rich in cinchona. Very thick; scarcely liquid.

LIQUOR OF ERGOT OF RYE. *Syn.* Essence of Ergot. Liquor Ergotæ. Liquor

SECALIS CORNUTI. CONCENTRATED INFUSION OF ERGOT OF RYE. *Prep.* Ergot 3 lbs.; grind in a pepper-mill, add water 8 lbs.; macerate for 12 hours, add rectified spirit 2 quarts; macerate for a week in a corked bottle, press out the liquor, and filter. Contains ¼th ergot, is 8 times as strong as the ordinary infusion, and 2½ times as strong as the tincture of ergot of Apothecaries' Hall. *** In the formula given at ERGOT, the quantity of ergot is wrongly stated.

LIQUOR OF SARSAPARILLA. *Syn.* FLUID EXTRACT OF SARSAPARILLA. LIQUOR SARZÆ, &c. Either *the simple* or the *compound liquor of sarsaparilla* may be prepared by evaporating the corresponding decoction, carefully prepared, to a proper consistence, straining through flannel, and adding a *little* spirit. Jamaica sarza should be alone employed, as the other varieties, especially the Honduras, not only possess less virtue, and yield less extract, but are very liable to ferment, and get mouldy.

LIQUOR OF TARAXACUM. *Syn.* FLUID EXTRACT OF TARAXACUM. DO. DO. OF DANDELION. LIQUOR TARAXACI. *Prep.* I. Dried dandelion roots 28 lbs.; rinse them in clean cold water, to remove dirt, slice them small, macerate in enough cold water to cover them, for 24 hours, press out the liquid, allow the fecula to subside, decant the clear, heat it to 180° or 190°, to coagulate the albumen, filter while hot, and evaporate by steam, or preferably by a current of warm air, or in vacuo, till the liquid be reduced to 22 lbs.; to this add rectified spirit of wine 6 lbs.; mix well, set it aside in a corked bottle for a week or a fortnight, and decant the clear from any sediment that may have formed. A very fine article. It represents an equal weight of the roots.

II. Heat the expressed juice of dandelion to near the boiling point, strain, evaporate as last, to a proper consistence, then add ¼ or ⅓ of spirit of wine, and proceed as before. Very odorous, and pale colored; stronger, and preferable to the preceding. (See EXTRACT OF DANDELION.)

LIRIODENDRINE. A white crystalline substance, resembling boracic acid, found in the bark of the root of liriodendron tulipifera. It has a bitter taste, and is soluble in alcohol, and slightly so in water.

LISBON DIET DRINK. *Prep.* Sliced sarsaparilla and china roots, of each ℥j; the dried peels of 20 walnuts coarsely powdered; antimony ℥ij; powdered pumice stone ℥j; water 10 pints; the antimony and pumice are to be tied in a cloth and boiled with the other ingredients, till the liquid be reduced to one half, when it must be strained. The above is said to be the *original* receipt for the Lisbon diet drink, but compound decoction of sarsaparilla is now universally used instead.

LITHARGE. *Syn.* LYTHARGE. OXIDE OF LEAD. PROTOXIDE OF LEAD. SEMI-VITRIFIED OXIDE OF LEAD. LITHARGE, (*Fr.*) GLATTE, BLEIGLATTE, (*Ger.*) LITARGIRO, (*Ital.*) LITARGIRIO, (*Span.*) LITHARGYRUM, (P. E.) PLUMBI OXYDUM, (P. L.) PLUMBI OXYDUM SEMI-VITREUM, (P. D.) LITHARGYRUS. MOLYBDENA, (Pliny.) Λιθάργυρον, (Hippocrates.) Litharge is prepared by scraping off the dross that forms on the surface of melted lead exposed to a current of air, (*dross of lead, plumbum ustum,*) and heating it to a full red to melt out any undecomposed metal. The fused oxide in cooling forms a yellow or reddish semicrystalline mass, which readily separates into scales; these when ground constitute the powdered litharge of the shops. Litharge is also prepared by exposing red lead to a heat sufficiently high to fuse it, and *English litharge* is obtained as a secondary product by liquefaction, from argentiferous lead ore. The litharge of commerce is distinguished by its color into LITHARGE OF GOLD, (*Lithargyrum Auri,*) which is dark colored and impure, and LITHARGE OF SILVER, (*Lithargyrum Argenti,*) which is purer, and paler colored. The dark color of the former is chiefly owing to the presence of red lead. In grinding litharge about 1 lb. of olive oil is usually added to each 1 cwt., to prevent dust.

Use. Litharge is employed *in pharmacy,* to make plasters and several other preparations of lead; by painters as a '*drier*' for oils, and for various other purposes in the arts.

Pur. "Almost entirely soluble in dilute nitric acid. The matter thrown down from this solution by liquor of potassa is white, and is redissolved by excess of it." (P. L.) "50 grs. dissolve entirely, and without effervescence, in f℥iss of pyroligneous acid; and the solution precipitated by 53 grs. of phosphate of soda, remains precipitable by more of the test." (P. E.) Both of the above solutions should be colorless. It is of great importance to the pharmaceutist to obtain pure litharge, as the slightest impurity will often color and spoil his lead plaster, (*emp. plumbi,*) and solution of diacetate of lead, (*liq. plumbi diacetatis.*)

LITHIA, (from λίθειος, *lapideus.*) *Syn.* OXIDE OF LITHIUM. An alkali or alkaline earth, discovered in 1818, by M. Arfwedson, in a mineral called *petalite.* It has since been found in a few other minerals.

Prep. (Berzelius.) Finely powdered petalite or spondumene 1 part; fluor spar 2 parts; mix, add oil of vitriol 10 parts, and heat the mixture as long as acid vapors are evolved. The residuum must be dissolved in pure water of ammonia, boiled, filtered, the solution evaporated to dryness, and the dry mass heated to redness. The matter left is pure *sulphate of lithia,* from which *pure lithia* may be obtained by decomposing it by acetate of baryta, and by expelling the acetic acid from the filtered solution by heat.

Prop., &c. Lithia is caustic, alkaline, and sparingly soluble in water. It is distinguished from *potassa* and *soda* by its phosphate and carbonate being scarcely soluble in water,—from *baryta, strontia,* and *lime,* by forming soluble salts with sulphuric and oxalic acids,—and from *magnesia,* by the solution of its carbonate exhibiting an alkaline reaction. Heated on platinum it tinges the flame of the blowpipe red. With the acids, lithia forms salts, most of which may be made by its direct solution in the former.

LITHIC ACID. (See URIC ACID.)

LITHIUM. The metallic base of lithia, obtained by Sir H. Davy by exposing lithia, or oxide of lithium, to galvanic action. Its existence as a metal was so transient, that its properties could not be examined. It is white colored, like Sodium.

LITHOCHOLIC ACID. A new acid dis-

covered by Wöhler in a biliary concretion. It possesses no practical interest.

LITHOFELLIC ACID. An acid recently discovered by Göbel, in a biliary concretion. It forms the chief portion of the substances called *bezoar stones*. It was obtained by digesting the calculus in boiling alcohol of 98%, evaporating, and redigesting the residue first in cold and then in boiling alcohol; from the latter solution the acid was obtained by slow evaporation. Colorless and crystalline when pure, forming salts with the bases.

LITHOGRAPHIC INK. *Prep.* I. Mastich in tears 8 oz.; shellac 12 oz.; Venice turpentine 1 oz.; melt together, add wax 1 lb., tallow 6 oz.; when dissolved, further add hard tallow soap, in shavings, 6 oz.; when the whole is combined, add lampblack 4 oz.; mix well, cool a little, and then pour it into moulds or on a slab, and when cold cut it into square pieces.

II. (M. Lasteyrie.) Dry tallow soap, mastich in tears, and common soda in fine powder, of each 30 parts; shellac 150 parts; lampblack 12 parts; mix as last. Both the above are used for writing on lithographic stones.

III. (*Autographic.*) *a.* White wax 8 oz., and white soap 2 to 3 oz.; melt, when well combined add lampblack 1 oz.; mix well, and heat it strongly; then add shellac 2 oz.; again heat it strongly; stir well together, cool a little, and pour it out as before. With this ink lines may be drawn of the finest to the fullest class, without danger of its spreading, and the copy may be kept for years before being transferred.

b. White soap and white wax, of each 10 oz.; mutton suet 3 oz.; shellac and mastich, of each 5 oz.; lampblack 3½ oz.; mix as above. Both the above are used for writing on lithographic paper. When the last one is employed, the transfer must be made within a week.

Remarks. The above inks are rubbed down with a little water in a cup or saucer for use, in the same way as common water-color cakes, or Indian ink. In winter, the operation should be performed near the fire, or the saucer should be placed over a basin containing a little *warm* or *tepid* water. Either a steel-pen or camel's hair pencil may be employed with the ink. (See Lithography.)

LITHOGRAPHIC PAPER. *Prep.* I. Starch 6 oz.; gum arabic 2 oz.; alum 1 oz.; make a strong solution of each separately, in hot water, mix, and apply it while still warm to one side of leaves of paper, with a clean painting-brush. When dry, a second and a third coat may be given; lastly, press it, to make it smooth.

II. Give the paper three coats of thin size, one coat of good white starch, and one coat of a solution of gamboge in water; the whole to be applied with a sponge, and each coat to be allowed to dry before the other is applied. The whole of the solutions should be fresh made.

Remarks. Lithographic paper is used to write on with lithographic ink. The writing may be transferred by simply moistening the back of the paper, and evenly pressing it on the stone, when a reversed copy is obtained, which may be used to print from, and will yield corrected copies, resembling the original writing or drawing.

LITHOGRAPHY. (From λιθος, *a stone*, and γραφειν, *to write or draw.*) The art of engraving on stone. Want of space must limit our notice of this beautiful art to the following remarks, which are inserted to explain the method of using lithographic crayons, ink, and paper.

There are two modes of lithography in general use. For the one a drawing is made on the lithographic stone, with a *lithographic crayon*, (see Crayons, Lithographic,) or with *lithographic ink*, and when the design is dry, a very weak solution of oil of vitriol, or muriatic acid, is poured upon the stone, which acts by removing the alkali from the chalk or ink used to draw the design, and thus leaves them in a permanent and insoluble form. The acid also removes a very small portion of the surface of the stone occupied by the lights of the drawing, and renders it more absorbent. In the other method, the design is made on *lithographic paper*, (see the last article,) which paper, on being moistened, laid on the stone, and passed through the press, leaves its design on the stone, which is then acted on by acid as before described. To print from stones so prepared, water is thrown on them, and the roller, charged with printing ink, passed over them, when the paper is applied, and a copy is obtained by the action of the press. The same process must be had recourse to for each copy. The nature of the stone is such that it retains with great tenacity the resinous and oily substances contained in the ink or crayon employed to form the design, and also absorbs water freely; this, combined with the peculiar affinity between resinous and oily substances, and their mutual power of repelling water, occasions the ink on the printing roller to *adhere* to the design, or resinous portion, and to leave *untouched* the lights or watered parts of the stone. The stones are prepared by polishing in the ordinary way; the style of work for which they are intended determining the degree of labor bestowed upon them. For crayon drawings, the surface should have a fine grain, but the finish of the stone must depend upon the desired softness of the intended drawing; for writing or drawing on in ink, the surface must receive a higher polish, and must be finished off with pumice stone and water. The best lithographic stones are obtained from Solenhofen, near Munich, and from Pappenheim, on the banks of the Danube. The white lias which lies immediately under the blue, near Bath, also yields good lithographic stones.

LIVER OF ANTIMONY. *Syn.* Hepar Antimonii. A crude oxysulphuret of antimony, prepared by roasting crude antimony to a dull gray, and then melting it. Another preparation, made by mixing and melting common antimony with twice its weight of potash, is also called *liver of antimony*, and is used by farriers as a strong purge for grease in horses' heels.

LIVER OF SULPHUR. Fused sulphuret of potassium.

LOBELIANIN. This name has been given by Dr. Pereira to the butyraceous volatile oil obtained by distilling Indian tobacco (*lobelia inflata*) along with water.

LOBELIC ACID. This name has been given to the acid existing in decoction of lobelia. The decoction reddens litmus, and is precipitated by several metallic salts.

acetate of lead is mixed with one-tenth of its volume of liquor of ammonia, and set aside; anhydrous crystalline needles are deposited. A solution of this salt is formed when a solution of the neutral acetate is digested on finely powdered litharge, till the undissolved oxide turns white. By evaporation out of contact with air, small crystals may be obtained. Goulard's extract, and the liquor of diacetate of lead of the pharmacopœia, are solutions of this salt.

SESQUIBASIC ACETATE OF LEAD is prepared by gently fusing the neutral acetate of lead till it spontaneously forms a white porous mass. By solution in water, evaporation to a sirup, and cooling slowly, crystals may be obtained.

SEXBASIC ACETATE OF LEAD (*sexsubacetate of lead*) is a white crystalline precipitate, which forms when a solution of subacetate of lead is treated with liquor of ammonia. A hot saturated solution in water crystallizes on cooling. All the preceding acetates are soluble in water. The last two are neither employed in the arts nor in medicine.

LEAD, ARSENIATE OF. *Syn.* TRIARSENIATE OF LEAD. PLUMBI ARSENIAS. *Prep.* Gradually add a solution of acetate of lead to another of arseniate of soda. A white insoluble powder.

LEAD, BROMIDE. *Syn.* PLUMBI BROMIDUM. A white crystalline powder, sparingly soluble in water, formed by precipitating a solution of neutral acetate or nitrate of lead, with a solution of bromide of potassium. It fuses by heat into a red liquid, which turns yellow when cold.

LEAD, CHLORIDE OF. *Syn.* MURIATE OF LEAD. PATENT YELLOW. HORN LEAD. PLUMBI CORNEUM. PLUMBI MURIAS. PLUMBI CHLORIDUM, (P. L.) *Prep.* Precipitate a solution of ℥xix of acetate of lead in 3 pints of boiling distilled water, with a solution of ℥vj of chloride of sodium in 1 pint of boiling water; when cold wash and dry the precipitate, (P. L.)

Remarks. Employed in the preparation of muriate of morphia. It is totally dissolved by boiling water, the chloride concreting almost entirely into crystals as the solution cools. (P. L.)

LEAD, CHROMATE OF. In addition to the remarks on this article at page 192, it may be interesting to add that Anthon has found that when *hot* solutions of equal equivalents of acetate of lead (190 parts) and chromate of potash (100 parts, both neutral and in crystals) are mixed, the yellow precipitate when dried is *anhydrous;* but when the mixture is made at ordinary temperatures, the precipitate has a *paler* yellow, and when dried contains 1 eq., or nearly 5¼ per cent. of water. (Buch. *Rept.*) It thus appears that the shades of color of chrome yellow may be varied without any foreign addition.

LEAD DUST. *Syn.* PULVIS PLUMBI. By melting new lead, adding bruised charcoal, and diffusing the lead among it, then pounding and washing away the charcoal; used by potters.

LEAD, FLUORIDE. A white powder formed by precipitating a solution of neutral acetate of lead with hydrofluoric acid. It is very sparingly soluble in water.

LEAD, GRANULATED. By melting new lead, pouring it in small stream, from an iron ladle with a hole drilled in its bottom, into a pail of water. *Used* to make solutions and alloys.

LEAD, IODIDE OF. *Syn.* IODURET OF LEAD. PLUMBI IODIDUM, (P. L.) PLUMBI IODURETUM. *Prep.* I. (P. L.) Acetate of lead ℥ix water 6 pints; dissolve; iodide of potassium (pure) ℥vij; water 2 pints, dissolve. Add the latter solution to the former, wash and dry the precipitate.

II. (P. E.) Iodide of potassium and nitrate of lead, of each ℥j; dissolve each separately in ½ pint of water, mix, collect the precipitate in a calico or linen filter, and wash it with water; then boil it in 3 gallons of water, soured with pyroligneous (acetic) acid f℥iij, let the solution settle (still keeping the liquid near the boiling point,) and decant the clear; as the water cools, the iodide will subside in brilliant golden yellow lamellæ, or minute crystals.

Remarks. The latter is the best process, as any adhering oxide of lead is dissolved out by the acid. "It is totally dissolved by boiling water, and, as it cools, separates in shining yellow scales. It melts by heat, and the greater part is first dissipated in yellow, and afterwards in violet vapors," (P. L.) The residuum is quite soluble in nitric acid. "5 grs. of iodide of lead are entirely soluble (by boiling) in f℈j of pyroligneous acid, diluted with f℥iss of water; and golden crystals are abundantly deposited as the solution cools." (P. E.) *Dose.* ½ gr. to 4 grs. or more, made into a pill, in enlargements of the cervical, axillary, and mesenteric glands, and in scrofulous affections and scirrhous tumors, as a deobstruent and resolvent. (See OINTMENT, IODIDE OF LEAD.)

LEAD, NITRATE OF. *Syn.* PLUMBI NITRAS. *Prep.* (P. E.) Litharge ℥ivss; diluted nitric acid 1 pint; dissolve by a gentle heat, and set the solution aside to crystallize. *Used* to make the *iodide of lead*, P. E.

LEAD, OXIDES OF. *Prep.* I. (*Dioxide. Suboxide. Gray oxide.*) Prepared by heating dry oxalate of lead to a low red in a glass tube out of contact with the air. Dark-gray, nearly black. It is also formed on the surface of metallic lead long exposed to the air.

II. (*Oxide. Protoxide. Yellow oxide.*) This oxide is prepared on the commercial scale by heating the gray film or dross that forms on the surface of melted lead exposed to the air, until it acquires a uniform yellow color, when it is called "*massicot;*" when the heat is still further increased until it fuses or partially vitrifies, the term "*litharge*" is applied to it. It is obtained perfectly pure by expelling the acid from nitrate of lead, by exposing it to heat in a platinum crucible; or, still better, by adding ammonia to a *cold* solution of nitrate of lead until the liquid becomes faintly alkaline, washing the precipitate with cold water, drying, and heating it to moderate redness for one hour, as above. Pure protoxide of lead has a lemon-yellow color, and is the base of all the salts of lead. It may be obtained in a crystalline state by exposing a concentrated solution of it in caustic soda to the air for some months, (M. Houton Labadilliere;) or, still easier, by mixing an aqueous solution of neutral acetate of lead with a great excess of liquor of ammonia, filtering, and exposing the liquid for a few hours in a well-corked bottle to the sun's rays. If the same solution be kept in the dark for some days, stellated crystals of basic acetate of lead, with five atoms of base, are deposited

of tumors, &c.,—*detergent* lotions, to clean foul ulcers, &c.,—*repellent and resolvent* lotions, to discuss tumors, remove eruptions, &c. Lotions are usually applied by wetting a piece of linen with them, and keeping it on the part affected, or by moistening the part with the fingers previously dipped into them. Lotions are more agreeable if made with rose water.

LOTION, ACID. *Syn.* Lotio Acida. *Prep.* I. (Collier.) Strong nitric acid f℥ss; water 1 pint; mix. Dr. Collier says that he has cured lepra of 14 years' standing by the use of this lotion, accompanied by proper doses of the solution of corrosive sublimate, P. L.

II. (Guy's H.) Nitric acid 38 drops; water 1 pint. Used in mortification.

III. (Copland.) Nitromuriatic acid ʒj; water f℥xvj; mix. In mortification and liver complaints.

LOTION, ALKALINE. *Syn.* L. Alcalina. *Prep.* (P. Cod.) Carbonate of potash ℥ij; rose water 1 quart; mix. Detergent, stimulant.

LOTION, ANTIPHLOGISTIC. *Syn.* L. Antiphlogistica. *Prep.* (Copland.) Solution of diacetate of lead (P. L.) ʒvj; liquor of acetate of ammonia ℥iv; water 1 quart; mix. Refrigerant, sedative, repellent. Used to allay inflammation.

LOTION, ANTIPSORIC. *Syn.* L. Antipsorica. *Prep.* (Cazenave.) Sulphuret of potassium ʒj; soap (soft) ʒij; water ℥viij; dissolve. An excellent remedy for the itch. It leaves but little smell behind, and does not soil the linen.

LOTION, ASTRINGENT. *Syn.* L. astringens. *Prep.* I. Alum ½ oz.; water 1 pint; dissolve.

II. Muriate of iron, or blue vitriol, 1 oz.; water ½ pint. Some use less water. The last is used for horses and cattle.

LOTION, CAMPHORATED. *Syn.* L. Camphorata. L. Plumbi diacetatis camphorata. *Prep.* Diluted solution of diacetate of lead, P. L., ℥viij; spirit of camphor ʒij; mix, and shake well. Refrigerant and anodyne, employed in erysipelatous inflammations, burns, contusions, sprains, excoriations, &c.

LOTION, DISINFECTING. L. Disinfectans. L. Chlorinii. *Prep.* (Majendie.) Liquor of chloride of soda f℥j; water ½ pint.

II. Chloride of lime ʒiij; water 1 pint; dissolve. Both are good washes for foul ulcers, the itch, the teeth, to sweeten the breath, and remove the smell of tobacco smoke, and for various similar purposes.

LOTION, EVAPORATING. *Syn.* L. Evaporans. *Prep.* (Copland.) Sulphuric ether, rectified spirit of wine, and solution of acetate of ammonia, of each f℥iss; rose water f℥iiiss; mix. Some add solution of diacetate of lead (diluted) ʒvj. Refrigerant, if allowed to evaporate by free exposure; stimulant, if the evaporation is prevented by covering the part with the hand. Useful in nervous headache, &c.

LOTION FOR TENDER-MOUTHED HORSES. *Prep.* Powdered alum or borax 1 oz.; honey ¼ lb.; infusion of roses 1 lb. To be used with a syringe.

LOTION FOR GREASE. *Prep.* 1. Sugar of lead ¼ lb.; vinegar ½ pint; water 1½ pints; mix.—2. Alum 6 oz.; blue vitriol 1 oz.; water 1 quart.—3. Alum 1 oz.; oil of vitriol 1 dr.; water 1 pint.—4. Corrosive sublimate ½ oz.; spirit salts 1 oz.; water 1 quart. The first three used when the horses' heels are inflamed irritable; the last, when the discharge is fetid.

LOTION FOR INFLAMMATORY TUMORS, &c. *Prep.* (A. T. Thomson.) Sal monia ʒj; rectified spirit f℥j; soft water f℥v; and dissolve.

LOTION FOR SWELLED JOINTS, *Prep.* (A. T. Thomson.) Opium ʒij; vinegar f℥vj; triturate together. To allay p

LOTION FOR OPHTHALMIA. *Prep.* T. Thomson.) *a.* Sulphate of zinc and acet lead, of each 10 grs.; rose and elder-flower of each f℥iij; mix. To be applied either al diluted with water, after local bleeding.—*b.* S of lead 9 grs.; distilled vinegar fʒiij; rec spirit fʒj; rose water f℥vss; mix. Used in acute stages.

LOTION FOR GALLS, &c. *Prep.* 1. egar and spirit of wine, of each 4 oz.; suga lead ½ oz.; water ½ pint; mix.—2. Soap lin and solution of acetate of ammonia, equal pa 3. Sal ammoniac 1 oz.; muriatic acid 3 dr.; ter 1 pint. Used by farriers for saddle ga warbles.

LOTION FOR MANGE. *Prep.* 1. Co sive sublimate ¼ oz.; spirits of salt ½ oz.; wate quart.—2. Corrosive sublimate 1 dr.; sal am niac ½ oz.; water 1 pint.—3. To the last add decoction of white hellebore ½ pint. Used for in horses, cattle, and dogs, when sulphur oint fails.

LOTION FOR STRAINS. Sugar of l 1 oz.; vinegar and water, of each ½ pint; ca phorated spirit ¼ oz.; mix. Used by farriers.

LOTION, GOWLAND'S. *Prep.* Blanc bitter almonds 1 oz.; blanched sweet almond oz.; beat to a paste, add pure water 1 pint, well, strain through a piece of coarse muslin, it into a bottle, add corrosive sublimate in powd 10 to 12 grs., dissolved in a teaspoonful or two spirit of wine, and shake well. Used as a cosmet to improve the complexion; also as a wash obstinate eruptions. For the latter purpose, quantity of corrosive sublimate may be doubl but the weight given above should not be exceed when the lotion is intended for a cosmetic. A beautifier of the complexion, it is employed wetting the skin with it, either by means of corner of a napkin, or the fingers dipped into and it is then gently wiped off with a dry cl (See Cosmetics, and Lotion of Bichloride Mercury.)

LOTION, MERCURIAL. *Prep.* I. (*Bl wash. Black lotion. Lotio nigra. Aqua curialis nigra. L. hydrargyri nigra. phagedænic lotion. Aqua phagedænica* 1. Calomel ʒj; lime water 1 pint; mix, shake well. These are the usual proportions.— (Guy's H.) Calomel ʒj; lime water ℥viij; as last. The bottle should be well shaken the lotion is applied. Black wash is a favorite plication to all kinds of syphilitic sores.

II. (*Yellow wash or lotion. Red do. Ph gedænic do. Lotio flava. Lotio or aqua gedænica. L. hydrargyri flava.*) 1. Co sublimate in powder ʒss; lime water 1 pint;

shake well. 2. (Guy's H.) Corrosive sublimate 15 grs.; water 1 pint. As last. It should be well shaken before use. A common application to syphilitic and scrofulous sores.

LOTION OF ALUM. *Syn.* L. ALUMINIS. Prep. I. (St. B. H.) Alum ʒss; water 1 pint; dissolve. Astringent. Used for sore gums, nipples, &c.

II. Alum and white vitriol, of each ʒij; vinegar f℥j; water 1 pint; mix, and dissolve. *Used* for chilblains.

LOTION OF AMMONIA, (ACETATE.) *Syn.* L. AMMONIÆ ACETATIS. *Prep.* (P. C.) Liquor of acetate of ammonia, rectified spirit of wine, and water, equal parts. Used in phlegmonous inflammation.

LOTION OF AMMONIA, (MURIATE.) *Syn.* L. SALIS AMMONIACI. L. AMMONIÆ MURIATIS. Prep. I. (Pereira.) *a.* Sal ammoniac ℥j to ℥ij; water f℥xij; dissolve. Spirit of wine f℥iv is sometimes added. Used in contusions, ecchymosis, and cirsocele, when the skin is sound; in chronic tumors of the breast, white swellings, chronic affections of the joints, hydrocele, chilblains, &c.—*b.* Sal ammoniac ʒj to ʒiv; water 1 pint; dissolve. In itch, ulcers, &c., and as an injection and eye-water.

II. (Justamond.) Sal ammoniac ℥j; spirit of rosemary 1 pint. As above.

III. (St. B. H.) Sal ammoniac ℥ss; water and spirit of wine, of each 1 pint. As above.

LOTION OF AMMONIA, (OPIATED.) *Syn.* L. AMMONIÆ OPIATA. *Prep.* (Dr. Kirkland.) Compound spirit of ammonia ℥iiiss; tincture of opium ℥ss; water ℥iv; mix. Anodyne and stimulant.

LOTION OF BELLADONNA. *Syn.* L. BELLADONNÆ. *Prep.* (Graefe.) Extract of deadly nightshade ʒj; diluted solution of diacetate of lead (P. L.) 1 pint; dissolve. Applied to tumors, and glandular enlargements.

LOTION OF BORAX. *Syn.* L. BORACICA. Prep. (Copland.) Powdered borax ʒj; rose and orange-flower waters, of each ℥iij; dissolve. A fragrant and effective application to sore gums, sore nipples, excoriations, &c.

LOTION OF BICHLORIDE OF MERCURY. *Syn.* L. HYDRARGYRI BICHLORIDI. L. HYDRARGYRI MURIATIS. *Prep.* I. (P. C.) Corrosive sublimate 16 grs.; muriatic acid 8 drops; water f℥xvj; mix.

II. (St. B. H.) Corrosive sublimate 2½ grs.; water 1 pint; gum acacia ℥ss; mix.

III. (*Lotio hydrargyri amygdalina*, St. B. H.) Corrosive sublimate 10 grs.; blanched bitter almonds ℥j; water 1 pint. All the above are used in obstinate eruptions. This resembles *Gowland's lotion*, and may be used for it. The ingredients are mixed in the same way.

LOTION OF CYANIDE OF POTASSIUM. *Syn.* L. POTASSII CYANIDI. *Prep.* (Cazenave.) Cyanide of potassium ℈ss: emulsion of bitter almonds ℥vj; dissolve. (See LOTION OF PRUSSIC ACID.)

LOTION OF ELDER-FLOWERS. *Syn.* L. SAMBUCI. *Prep.* (Ryan.) Infusion of elder-flowers 1 pint; spirit of camphor ℥viij; mix. Emollient and anodyne.

LOTION OF GALLS. *Syn.* L. GALLÆ. *Prep.* (St. B. H.) Bruised galls ʒij; boiling water 1 pint; infuse an hour, and strain. Astringent. An excellent application to sore nipples, or to strengthen them before suckling spirit of wine ℥iij may be advantageously added, and a like portion of water omitted.

LOTION OF LIME. *Syn.* L. CALCIS SPIRITUOSA. *Prep.* (P. C.) Spirit of wine ℥iv; lime water ℥viij; mix.

LOTION OF LEAD, (ACETATE.) *Syn.* L. PLUMBI ACETATIS. *Prep.* (Collier.) Sugar of lead ʒj; pure water, or rose water ℥viij; dissolve. Astringent, refrigerant. Applied to excoriations, burns, sprains, contusions, &c. (See SOLUTION OF DIACETATE OF LEAD.)

LOTION OF MYRRH. *Syn.* L. MYRRHÆ. *Prep.* (Dr. Kirkland.) Tincture of myrrh and lime water, equal parts; mix. Applied to scorbutic ulcers and gums.

LOTION OF MYRRH, (COMPOUND.) *Syn.* L. MYRRHÆ COMPOSITA. *Prep.* (P. C.) Honey of roses and tincture of myrrh, of each ʒij; lime water ℥iiss; mix. As last; also used as a dentifrice.

LOTION OF PRUSSIC ACID. *Syn.* L. ACIDI HYDROCYANICI. *Prep.* I. (Majendie.) Medicinal prussic acid ʒj to ʒiv; lettuce water f℥xxxvj; mix.

II. (A. T. Thomson.) Medicinal prussic acid and rectified spirit, of each fʒij; distilled water f℥viiss; sugar of lead 16 grs.; mix.

III. (Sneider.) Medicinal prussic acid ʒiss; rectified spirit and water, of each f℥vj; mix. Lotions of prussic acid have been employed to allay pain and irritation in various chronic skin diseases, especially scaly and itchy eruptions, and in cancer, with variable success.

LOTION OF OPIUM. *Syn.* L. OPII. *Prep.* (St. B. H.) Opium ʒiss; boiling water 1 pint; triturate and strain. Used for painful and irritable ulcers.

LOTION OF SOAP. *Syn.* LIQUID SOAP. L. SAPONIS. L. SAPONACEA. *Prep.* (P. L. 1746.) Liquor of carbonate of potash ℥ss; olive oil ℥iv; rose water ℥xij; mix, and agitate well. Emollient. Chiefly used as a cosmetic.

LOTION OF SPIRIT, (CAMPHORATED.) *Syn.* L. SPIRITUOSA CAMPHORATA. *Prep.* (Ware.) Elder-flowers ℥ss; camphor ʒss; rectified spirit ℥iv; macerate 24 hours, then press out the liquor. Stimulant and fragrant.

LOTION OF SULPHATE OF COPPER. *Syn.* L. CUPRI SULPHATIS. *Prep.* Blue vitriol ʒj; powdered camphor ℥j; boiling water 2 quarts; infuse in a close vessel 1 hour. For phagedænic ulcers.

LOTION OF SULPHATE OF ZINC. *Syn.* L. ZINCI. L. ZINCI SULPHATIS. *Prep.* I. (P. C.) Sulphate of zinc ʒss; water ℥viij; dissolve. Astringent. Used in some chronic skin diseases, as a wash for loose flabby granulations, and for ulcers that discharge profusely, &c.

II. (Collier.) Sulphate of zinc ʒij; water 1 pint; dissolve. As a counter-irritant in pains of the joints, periosteum, old sprains, &c.

LOTION, RUBEFACIENT. *Syn.* L. RUBEFACIENS. L. ANTIMONII POTASSIO-TARTRATIS. *Prep.* I. (Pereira.) Emetic tartar ʒj; boiling water ℥iss; dissolve. Employed as a local irritant instead of the ointment

II. (Sir Wm. Blizard.) Emetic tartar 20 grs.; boiling water ℥j; dissolve. Used to cleanse foul ulcers, to repress fungous growths and warts, in ringworm, &c.

III. (Ger. H.) Emetic tartar ʒj; water 1 pint; tincture of camphor ℥ss; mix. All the above are rubefacient and irritant. The last one, diluted with twice or thrice its weight of water, is employed as a collyrium in chronic ophthalmia, and in specks on the cornea.

LOTION, TAR. *Syn.* L. Picis liquidæ. *Prep.* (Saunders.) Quicklime ℥vj; water f℥xlviij; slake, add tar ℥iv, and boil to one half. This liquid consists of a solution of pyrolignite of lime, and pyrogenous oil and resin. It may be advantageously employed in various chronic skin diseases, especially those affecting the heads of children.

LOZENGE. *Syn.* Tablette, (*Fr.*) Trochiscus, (*Lat.*) In Pharmacy and Confectionary, a small round tablet, or flattened cylinder, chiefly composed of sugar, starch, or gum, and employed either as a simple demulcent or sweetmeat, or for the commodious exhibition of certain medicines. In the preparation of lozenges, the ingredients are first mixed, and well beaten into a stiff paste, which is next rolled out to a proper thickness, and cut into pieces of the desired shape by means of a small cylinder or punch of steel or tin. The newly-formed lozenges are then dried by placing them on an inverted sieve in a dry and airy situation, and frequently turning them, until they become hard and brittle; observing carefully to preserve them from the dust. To prevent the mass from sticking either to the fingers or utensils, a little powdered starch, or a *very little* olive oil scented with the same aromatic as that contained in the lozenges, may be used. Mucilage of gum arabic, or gum tragacanth, or the strained white of eggs, are the substances usually employed to make the pulverulent materials adhere together. All the ingredients should be reduced to a fine powder before mixing.

Lozenges made by melting one half of the sugar in a brass or iron pan, lipped to the right, with a little flavored water, then adding the other half of the powdered sugar, previously warmed, and dragging small portions of the grouty mass out by a wire, so as to fall on a stone or metal slab or plate, rubbed with a little powdered starch or sweet oil, are called "*drops*" by the confectioners, and "*pastilles*" (pastilli) by the French. (See Drops, Confectionary.)

Ambergris is the most suitable perfume for lozenges and tablettes for the mouth.

LOZENGES, ANTIMONY. *Syn.* Morsuli Stibii Kunkelii. Trochisci Antimonii. *Prep.* (P. Cod.) Prepared sulphuret of antimony and powdered cardamom seeds, of each ℥j; blanched almonds ℥ij; powdered white sugar ℥xiij; powdered cinnamon ʒiv; mucilage of tragacanth q. s.; mix as above, and divide into lozenges of 15 grs. each. One of the best modes of exhibiting sulphuret of antimony as an alterative.

LOZENGES, BARK. *Syn.* Tro. Cinchonæ. *Prep.* (P. Cod.) Powdered cinchona ℥ij; do. cinnamon ʒij; do. white sugar ℥xiv; mucilage of gum tragacanth q. s.; mix as above, and divide into 16 gr. lozenges. Tonic.

LOZENGES, BISMUTH. *Syn.* Tro. Bismuthi. *Prep* (Trousseau.) Trisnitrate of bismuth ʒij; white sugar ℥iiss; mucilage to mix. For [illegible] lozenges. Tonic and antispasmodic. 1 to 3, sucked 2 or 3 times daily, in dyspepsia, &c.

LOZENGES, BORAX. *Syn.* Tro. Boracis. Powdered borax ℥ss; do. white sugar ℥j; mucilage of gum tragacanth to mix. For 60 lozenges.

LOZENGES, CALOMEL. *Syn.* Tro. Calomelanos. *Prep.* (P. Cod.) Calomel ʒj; powdered sugar ʒxj; mucilage of tragacanth to mix; divide into 12 gr. lozenges. Alterative. A simple way of introducing mercury into the system. During their use, salt food and acid liquors should be avoided.

LOZENGES, CATECHU. *Syn.* Tro. Catechu. *Prep.* I. (*Tro. de terra Japonica*, P. L. 1744.) Powdered catechu ℥ij; do. tragacanth ℥ss; do. white sugar ℥xij; rose water to mix.

II. (*Tro. Catechu et Magnesiæ*, P. Cod.) Magnesia ℥ij; powdered catechu ℥j; do. sugar ℥xiij; mucilage of gum tragacanth made with cinnamon water, q. s. to mix.

III. (*Cachou Lozenges.*)—*a.* Powdered catechu 3 oz.; sugar 12 oz.; mucilage of gum tragacanth to mix.—*b.* (*Cachou à l'Ambre gris.*) To the last add ambergris 8 grs., or a sufficient quantity of the essence or tincture.—*c.* (*Cachou Musqué.*) The same, with musk 8 grs.; or essence q. s.—*d.* (*Cachou à la fleur d'Oranges.*) The same, with essence of neroli 8 drops.—*e.* (*Cachou à la Rose.*) The same, with otto of roses 6 drops.—*f.* (*Cachou à la Violette.*) The same, with powdered orris root (best) ¼ oz.; or essence of violets 1 oz.;—*g.* (*Cachou à la reglisse.*) Catechu 2 oz.; pure extract of liquorice 1 oz.; sugar 10 oz.; mucilage of tragacanth to mix.—*h.* (*Cachou à la Canelle.*) Catechu 3 oz.; powdered cinnamon ¼ oz.; sugar 1 lb.; mucilage of tragacanth to mix.—*i.* (*Cachou Aromatique. Cachou Aromatise.*) Powdered catechu 3 oz.; oil of cinnamon 15 drops; oil of cloves 2 drops; essence of ambergris ½ dr.; powdered sugar 1 lb.; mucilage of tragacanth made with rose or orange-flower water, q. s. to mix.

Remarks. All the above are taken in diarrhœa, in relaxation of the uvula, in irritation of the larynx, and as cosmetics to fasten the teeth, and disguise a stinking breath. The one containing magnesia (No. II.) is also sucked in dyspepsia and heartburn.

LOZENGES, CAYENNE. *Syn.* Tro. Capsici. *Prep.* I. Powdered sugar 1 lb.; mucilage of tragacanth q. s. to mix; add essence, tincture, or vinegar of cayenne, or a little soluble cayenne pepper dissolved in water to flavor.

II. (*Acidulated.*) To the last add tartaric acid ½ oz. Both are used in dyspepsia, and to promote digestion and create an appetite.

LOZENGES, CHALK. *Syn.* Heartburn Lozenges. Tro. Cretæ. Tro. Cardialgici. *Prep.* (P. E.) Powdered prepared chalk ℥iv; do. gum arabic ℥j; do. nutmeg ʒj; do. white sugar ℥vj; beat to a mass with water (rose or orange flower) and cut into lozenges. Antacid, absorbent, and astringent. 3 or 4 sucked ad libitum in heartburn, dyspepsia, diarrhœa, acidity of the stomach and bowels, &c. A simple and excellent remedy.

LOZENGES, CHARCOAL. *Syn.* Tro. Carbonis. *Prep.* I. (P. Cod.) Finely powdered pre-

ared charcoal ℥iv; do. white sugar ℥xij; mucilage to mix. Have been given with advantage in diarrhœa, cholera, and dyspepsia.

II. (*Tro. Carbonis cum Chocolata.* M. Chevallier.) Charcoal as above, and white sugar, of each ℥j; chocolate ℥iij; mucilage of gum tragacanth to mix. Nutritious.

LOZENGES OF CHLORIDE OF LIME. *Syn.* Tro. Calcis chloridi. Tro. Calcii chloratæ. *Prep.* Chloride of lime, dry and in fine powder, ¼ oz.; white sugar ¾ lb.; mucilage of tragacanth to mix. Used to sweeten the breath and whiten the teeth. They will not keep long.

LOZENGES, CHING'S. *Prep.* I. (*Yellow.*) Saffron ½ oz.; boiling water 1 pint; infuse, strain, add calomel 1 lb.; powdered white sugar 28 lbs.; mix well, then make a mass with tragacanth mucilage, and divide into 7000 lozenges. *** Too much care cannot be taken to thoroughly incorporate the ingredients, so that the calomel may be equally diffused through the mass. *Dose.* 1 to 6 over night, as a vermifuge, followed by an equal number of the brown lozenges (see below) next morning, fasting. Each lozenge contains 1 gr. of calomel.

II. (*Brown.*) Calomel 7 oz.; resinous extract of jalap 3½ lbs.; white sugar 10 lbs.; mix as last, with mucilage of tragacanth, and divide into 6125 lozenges. Each lozenge contains ½ gr. of calomel.

LOZENGES, CINNAMON. *Syn.* Tro. cinnamomi. *Prep.* I. Finely powdered cinnamon 4 oz.; do. sugar 12 oz.; mucilage of gum tragacanth to mix.

II. Finely powdered lump sugar 7 lbs.; oil of cinnamon (cassia) ¾ oz.; mucilage of gum tragacanth q. s. Stomachic. Cassia lozenges are made in the same way.

LOZENGES, CITRATE OF IRON. *Syn.* Tro. Ferri citratis. *Prep.* (Beral.) Ammonio-citrate of iron ʒj; water ℥ss; dissolve, add sugar ℥iss; evaporate to dryness, powder, make a mass with mucilage q. s., and divide into 15-gr. lozenges. Tonic.

LOZENGES, CLOVE. *Syn.* Tro. Caryophylli. *Prep.* I. Powdered cloves 2 oz.; sugar 1 lb.; mucilage of gum tragacanth to mix. Divide into 150 lozenges.

II. Powdered white sugar 7 lbs.; do. gum tragacanth 2 oz.; oil of cloves ½ oz.; mix with rose water. Stomachic. Both are used as restoratives after fatigue, added to chocolate to improve its flavor or render it stomachic, and sucked to sweeten the breath.

LOZENGES, COPAIBA. *Syn.* Tro. Copaibæ. *Prep.* Lump sugar 1 lb.; balsam of copaiba 1 oz.; oil of peppermint 20 drops; mix with mucilage.

LOZENGES, COUGH. *Syn.* Tro. Anti-catarrhales. Tablettes de Tronchin. *Prep.* (P. Cod.) Powdered gum arabic ℥viij; oil of aniseed 6 drops; extract of opium 12 grs.; Kerme's mineral ʒj; pure extract of liquorice ℥ij; white sugar ℥xxxij; mix with water, and divide into small lozenges.

LOZENGES, CROTON OIL. *Syn.* Tro. Crotonis. *Prep.* (Soubeiran.) Croton oil 5 drops; powdered starch ℈j; do. white sugar ʒj; chocolate ʒij; mix and divide into 30 lozenges; 5 or more generally prove cathartic.

LOZENGES, EMETIC. *Syn.* Tro. Emetinæ emetici. *Prep.* (Majendie.) Impure or colored emetina 32 grs.; or pure emetina 8 grs.; white sugar ℥ij; mucilage to mix; divide into 64 lozenges, 1 for a child, and 4 for an adult, as an emetic.

LOZENGES, GINGER. *Syn.* Tro. Zingiberis. *Prep.* I. Finely powdered Jamaica ginger 1 oz.; white sugar 1 lb.; mucilage of tragacanth to mix.

II. (Soubeiran.) Powdered ginger ℥j; white sugar ℥vij; mucilage to mix; divide into 15-gr. lozenges. Both the above are stomachic. Useful in flatulency and dyspepsia, and to create an appetite.

LOZENGES, GOLD. *Syn.* Tro. Auri. Tro. Sodii auro-chloridi. *Prep.* (Chrestien.) Soda muriate of gold 4 grs.; white sugar ℥j; mucilage of tragacanth to mix. For 60 lozenges. In scrofula, cancer, &c., 1, or at most 2 lozenges for a dose.

LOZENGES, GUM. *Syn.* Tro. Acaciæ, (P. E.) Tro. Gummosi. *Prep.* (P. E.) Powdered gum arabic ℥iv; do. starch ℥j; do. white sugar lb. j; mix with rose water, and divide into lozenges. The Paris Codex substitutes orange flower for rose water. Pectoral; demulcent. Useful to allay tickling coughs.

LOZENGES, GUM TRAGACANTH. *Syn.* Tro. Gummi Tragacanthæ. *Prep.* (P. E. 1744.) Sugar lb. j; compound tragacanth powder ℥iij; rose water ℥iv; mix. Similar to the last.

LOZENGES, HEARTBURN. *Syn.* Tablettes cardialgiæ. See Lozenges, Chalk and Magnesia.

LOZENGES, ICELAND MOSS. *Syn.* Tro. Lichenis. *Prep.* Iceland moss gelatin, dried and powdered, ℥ij; sugar ℥iv; gum acacia ʒiss; water q. s. to mix. Resemble gum lozenges.

LOZENGES, INDIAN HEMP. *Syn.* Tro. Cannabis. *Prep.* (M. Ebriard.) Extract of Indian hemp 12 grs.; sugar ℥iij; mucilage of tragacanth to mix; divide into 144 lozenges. (See Extract of Indian Hemp.)

LOZENGES, IPECACUANHA. *Prep.* I. (*Tro. Ipecacuanhæ*, P. Cod.) Powdered ipecacuanha ℥j; white sugar lb. iv.; mucilage of gum tragacanth to mix; divide it into 12-gr. lozenges. Each lozenge contains ¼ gr. of ipecacuanha. Produces, if properly made, 1920 lozenges.

II. (*T. Ipecac. cum chocolata*, P. Cod.) Chocolate (à la vanille) ℥xij; liquefy by a gentle heat, add powdered ipecacuanha ℥j; mix perfectly, and form it into 12-gr. lozenges, while warm. Both the above are pectoral and expectorant, and useful to allay tickling coughs, hoarseness, &c.

LOZENGES, KERMES. *Syn.* Tro. Kermetis. *Prep.* (P. Cod.) Kermes mineral ʒij; powdered white sugar ℥xvij; do. gum acacia ℥j; orange-flower water f℥j; mix, and divide into 12-gr lozenges. Each lozenge contains one-sixth of a gr. of Kermes mineral. Diaphoretic and expectorant.

LOZENGES, LACTATE OF IRON. *Syn.* Tro. Ferri Lactatis. *Prep.* (M. Cap.) Lactate of iron ʒss; white sugar ʒvj; mucilage of gum tragacanth q. s.; mix, and divide into 30 lozenges. Tonic. Useful in debility accompanied with a diseased state of the organs of digestion.

LOZENGES, LACTIC ACID. *Syn.* Tro. Acidi Lactici. *Prep.* (Majendie.) Lactic acid ʒij; powdered sugar ℥j; oil of vanilla 4 drops, (or essence ʒss;) mucilage of tragacanth q. s.; mix, and divide into ʒss lozenges. (See Lactic Acid.)

LOZENGES, LACTUCARIUM. *Syn.* Tro. Lactucarii, (P. E.) Prepared with lactucarium in the same manner as the opium lozenges, P. E. Each of these lozenges contains one-sixth to one-seventh of a grain of lactucarium. Anodyne. Used to allay tickling coughs.

LOZENGES, LEMON. *Syn.* Tro. Limonis. *Prep.* I. (P. Cod.) Essence of lemon ʒj; white sugar ℥xij; make them into drops, (pastilles,) as before directed, or into lozenges with mucilage of gum tragacanth.

II. Acidulated. *a.* (*Tro. Acidi Citri,* P. Cod.) Citric acid ʒiij; white sugar ℥xvj; essence of lemon 16 drops; mucilage of tragacanth q. s.; mix, and divide into 12-gr. lozenges. *b.* (*Tro. Acidi Tartarici,* P. E.) Tartaric acid ʒij; white sugar ℥viij; essence of lemon 10 drops; mucilage to mix. The last two may be made into drops instead of lozenges, when they will form '*acidulated lemon drops.*' Lemon lozenges and drops are agreeable sweetmeats, and those that are acidulated, very useful to promote expectoration, ("*cut the phlegm,*" as it is commonly called,) in coughs, &c.

LOZENGES, LIQUORICE. *Syn.* Black Lozenges. Tro. Glycyrrhizæ, (P. E.) Tro. Glycyrrh. Glabræ. Tro. Bechici Nigri. *Prep.* (P. E.) Extract of liquorice and gum acacia, of each, ℥vj; white sugar lb. j; dissolve in water, evaporate to a paste, and form into lozenges. Pectoral; demulcent. Useful to allay tickling coughs, and remove hoarseness.

LOZENGES, MAGNESIA. *Syn.* Tro. Magnesiæ, (P. E.) *Prep.* Carbonate of magnesia ℥vj; powdered white sugar ℥iij; oil of nutmeg 20 drops; mucilage of tragacanth to mix. Useful in heartburn and indigestion. The confectioners generally omit the nutmeg, and use only half the above quantity of magnesia, and make their mucilage with rose or orange-flower water. It is also an improvement to use calcined magnesia, which is about twice as strong as the carbonate, and consequently less need be employed.

LOZENGES, MANNA. *Syn.* Tro. Mannæ. *Prep.* (Van Mons.) Powdered tragacanth ʒj; do. white sugar ℥xij; manna ℥iij; orange-flower water to mix.

LOZENGES, MARSHMALLOW. *Syn.* Tablettes de Guimauve. Tro. Althææ. *Prep.* (P. Cod.) Powdered marshmallow root ℥ij; do. sugar ℥xiv; mucilage of tragacanth made with orange-flower water q. s.; mix, and divide into lozenges. Demulcent and expectorant. Useful to allay the irritation in cough, &c.

LOZENGES, MORPHIA. *Syn.* Tro. Morphiæ. *Prep.* (P. E.) Muriate of morphia ℈j; tincture of tolu f℥ss; powdered white sugar ℥xxv; dissolve the muriate in a little warm water, mix it with the tincture and the sugar, make a mass with mucilage of gum tragacanth, and divide into 15-gr. lozenges, each of which will contain about one-fortieth of a grain of muriate of morphia. Used as opium lozenges, but are pleasanter. The morphia lozenges of the shops generally contain one twenty-fourth of a gr. of muriate of morphia. (Pereira.)

LOZENGES, MORPHIA AND IPECACUANHA. *Syn.* Tro. Morphiæ et Ipecacuanhæ. *Prep* (P. E.) To the last, add ipecacuanha ʒj; each lozenge contains about one-fortieth of a gr. of muriate of morphia, and one-thirteenth of a gr. of ipecacuanha. Very useful to allay tickling coughs.

LOZENGES, NITRE. *Syn.* Tro. Nitri. Tro. e Nitro, (P. E. 1783.) *Prep.* Nitre ℥ij white sugar ℥ix; mucilage of tragacanth to mix Diuretic. Commonly sucked without swallowing, to remove incipient sore throat.

LOZENGES, NUTMEG. *Syn.* Tro. Myristicæ. As Cinnamon Lozenges.

LOZENGES, OPIUM. *Syn.* Tro. Opii. *Prep.* (P. E.) Opium (strained) ʒij; tincture of tolu ℥ss; triturate together, add powdered sugar ℥vj; extract of liquorice (soft) and powdered gum acacia, of each, ℥v; mix, and divide into 10-gr. lozenges; each of which will contain one-sixth or one-seventh of a gr. of opium. Used to allay tickling cough, and irritation of the fauces.

LOZENGES, ORANGE. *Syn.* Tro. Aurantii. *Prep.* I. As lemon lozenges, substituting essence of orange for essence of lemon.

II. (P. Cod.) Powdered sugar lb. j; neroli ℈j; orange-flower water q. s.; make it into drops, (*pastilli,*) or omit the water and make it into lozenges with mucilage of tragacanth made with orange-flower water. Very agreeable.

LOZENGES, ORRIS. *Syn.* Tro. Iridis *Prep.* Powdered orris 1 oz.; powdered sugar 1 lb. mucilage of tragacanth to mix. Used to perfume the breath.

LOZENGES, PECTORAL. *Syn.* Tro. Pectorales. *Prep.* I. (Dr. Grunn.) Powdered squills 4 parts; do. ipecacuanha 18 parts; extract of lettuce 8 parts; manna 125 parts; sugar 250 parts; mucilage of tragacanth to mix.

II. (Majendie.) Pure emetine 8 grs., or impure do. 32 grs.; powdered sugar ℥iv; mucilage q. s.; mix, and divide into 256 lozenges.

III. (*Yellow. Tro. Bechici Flavi.*) Powdered orris root ʒvj; starch ʒiv; liquorice powder ʒiij; saffron ʒij; sugar ℥viij; mucilage of tragacanth to mix. Each of the above is used in coughs, &c.

LOZENGES, PEPPERMINT. *Syn.* Tro. Menthæ Piperitæ. *Prep.* I. (*Best.*) Lump sugar, in fine powder, 14 lbs.; Mitcham oil of peppermint (best) 1 oz.; mucilage of gum tragacanth to mix. Very fine.

II. (*2d Quality.*) Sugar 12 lbs.; starch 2 lbs.; oil of peppermint ¾ oz.; mucilage to mix.

III. (*3d Quality.*) Sugar 7 lbs.; powdered starch 4 lbs.; oil of peppermint ½ oz.; mucilage to mix.

IV. (*Common.*) Sugar 8 lbs.; starch 4 lbs.; plaster of Paris 2 lbs.; oil of peppermint to flavor; mix.

V (*Trochisci menthæ piperitæ,* P. Cod.) Powdered sugar ℥xvj; oil of peppermint ʒj; mix, and divide into 12-gr. lozenges. The *peppermint drops* (pastilles) of the French Pharmacopœia are made with sugar ℥xij; oil of peppermint ʒj; and peppermint water q. s.

Remarks. The best peppermint lozenges are

made of the *very finest double refined sugar*, and of *English* oil of peppermint, carefully mixed up with very clean mucilage. The commoner qualities are made by employing inferior lump sugar and foreign oil of peppermint, or what is better, English oil of peppermint, but in a less proportion than for the better sorts. The addition of a very small quantity of blue smalts, reduced to an impalpable powder, is commonly made to the sugar, to increase its whiteness. *Transparent peppermint lozenges* are made from the same materials as the opaque ones, but the sugar is not reduced to quite so fine a powder, and the cake is rolled thinner before cutting it. A little oil of almonds or olives is also occasionally mixed with the ingredients, to promote the transparency, but tends to render the lozenges less white. Peppermint lozenges and drops are useful in flatulency.

LOZENGES, PONTEFRACT. (See EXTRACT OF LIQUORICE.)

LOZENGES, POPPY. *Syn.* TRO. PAPAVERIS. *Prep.* Extract of poppies 3 oz.; sugar 15 oz.; powdered gum tragacanth 2 oz.; rose water to mix. Used in coughs.

LOZENGES, QUININE. *Syn.* TRO. QUINIÆ SULPHATIS. *Prep.* (Soubeiran.) Sulphate of quinine 32 grs.; white sugar 1 lb.; mucilage of gum tragacanth q. s.; divide into 15-gr. lozenges. Tonic, febrifuge, and stomachic.

LOZENGES, RHUBARB. *Syn.* TRO. RHEI. *Prep.* (P. Cod.) Powdered rhubarb ℥j; do. sugar ℥xj; mucilage of tragacanth q. s.; mix, and divide into 12-gr. lozenges. Stomachic and laxative. Sucked before dinner they excite the appetite.

LOZENGES, ROSE. *Syn.* TRO. ROSÆ. *Prep.* I. (P. L. 1746.) Powdered red rose leaves ℥j; sugar lb. j; mix with weak mucilage.

II. (*Pâte de rose lozenges. Pati-rosa lozenges.*) Sugar 2 lbs.; otto of roses 10 drops; mix with mucilage. Very fine. Some add starch 4 oz., substitute oil of rhodium for otto of roses, and use mucilage made with rose water. If wanted red, make the mucilage with an infusion of cochineal, or red rose leaves.

LOZENGES, SAFFRON. *Syn.* TRO. CROCI. Powdered hay saffron 1 oz.; do. white sugar 1 lb.; mucilage of gum tragacanth to mix. Anodyne, pectoral, and emmenagogue.

LOZENGES, SODA. *Syn.* TRO. SODÆ BICARBONATIS. *Prep.* (P. E.) Bicarbonate of soda ℥j; powdered sugar ℥iij; do. gum arabic ℥ss; mix with mucilage. Antacid. Useful in heartburn, &c. (See CHALK LOZENGES.)

II. (*Pastilles de Vichy*, P. Cod.) Bicarbonate of soda ℥j; powdered sugar ℥xix; mucilage of gum tragacanth q. s.; mix, and divide into 20-gr. lozenges.

LOZENGES, SPONGE. *Syn.* TRO. SPONGIÆ. TRO. SPONGIÆ USTÆ. *Prep.* (P. Cod.) Powdered burnt sponge ℥iv; sugar ℥xij; mucilage of tragacanth q. s.; mix, and divide into 12-gr. lozenges. Taken in scrofula, &c.

LOZENGES, STARCH. *Syn.* TRO. AMYLI. TRO. BECHICI ALBI. *Prep.* (P. L. 1788.) Powdered starch ℥iss; do. liquorice ʒvj; do. orris root ʒiv; do. sugar lb. iss; mucilage of tragacanth to mix. Demulcent.

LOZENGES, STEEL. *Syn.* TRO. FERRI. *Prep.* I. (P. Cod.) Finely powdered iron filings ℥j; do. sugar ℥x; do. cinnamon ʒij; mucilage of tragacanth q. s.; mix, and divide into 480 lozenges. Tonic.

II. (*Aromatic.*) Sulphate of iron ʒiij; sugar ℥xvj; tincture of cantharidis ℥j; essence of orange 30 drops; mucilage of tragacanth q. s.; mix, and divide into 280 lozenges.

LOZENGES, SULPHUR. *Syn.* TRO. SULPHURIS. *Prep.* (P. Cod.) Sulphur (pure precipitated) ℥ij; sugar ℥xvj; mucilage of tragacanth made with rose water to mix. Useful in piles and some skin diseases.

LOZENGES, TOLU. *Syn.* TRO. TOLUTANI. *Prep.* (P. Cod.) Dissolve balsam of tolu ℥j, in rectified spirit ℥j; add water ℥ij; mix and filter; make a mucilage with the filtered liquid, and gum tragacanth ℈iv; add sugar ℥xvj; make a paste and cut it into lozenges. Pectoral. The confectioners usually employ only half the above proportion of balsam of tolu.

LOZENGES, VANILLA. *Syn.* TRO. VANILLÆ. *Prep.* (Guibourt.) Sugar ℥vij; vanilla ℥j; mix, powder together, and make it up with mucilage of gum tragacanth. Odorous; stomachic. *Used* to sweeten the breath, to flavor chocolate, &c.

LOZENGES, VIOLET. *Syn.* TRO. VIOLÆ. (See LOZENGES, ORRIS.)

LOZENGES, ZINC. *Syn.* TRO. ZINCI. *Prep.* Sulphate of zinc ʒiv; powdered sugar lb. ij; mucilage of tragacanth q. s.; mix, and divide into 12-gr. lozenges. Tonic, and in quantity emetic.

LUPININ. A gummy substance, obtained by M. Cassola from lupines.

LUPULINE. *Syn.* LUPULITE. The aromatic bitter principle of hops, (humulus lupulus.) It may be obtained by treating the aqueous extract of the yellow powder, or lupulinic grains of the strobiles, along with a little lime, with alcohol, evaporating the filtered tincture to dryness, redissolving in water, filtering, again evaporating to dryness, and digesting in ether. It is a yellowish-white, bitter, uncrystallizable substance, soluble in 20 parts of water, very soluble in alcohol, and slightly so in ether. The yellow powder above alluded to is also, though improperly, called lupulin.

LUCIFERS. Matches tipped with a mixture of sulphuret of antimony and chlorate of potash, (both in fine powder,) made into a paste with a solution of gum. They are inflamed by friction against a piece of emery, sand, or glass paper. (See CHLORATE MATCHES and CONGREVE.)

LUTE. *Syn.* LUT, (*Fr.*) KITTE; BESCHLAGE, (*Ger.*) LUTUM; CÆMENTUM, (*Lat.*) A composition employed to secure the joints of chemical vessels, or as a covering to protect them from the violence of the fire. *For the joints of vessels*, as *stills*, &c., not exposed to a heat much higher than 212° F., *linseed meal*, either alone or mixed with an equal weight of whiting, and made into a stiff paste with water, may be employed. *Ground almond cake*, from which the oil has been pressed, may also be used for the same purpose. *For the joints of small vessels*, as tubes, &c., especially of glass or earthenware, small rings of Indian rubber slipped over and tied above and below the joint, are very convenient substitutes for lutes, and have the advantage of lasting a long time, and

bearing uninjured the heat at which oil of vitriol boils. *For joining crucibles* to be exposed to a strong heat, a mixture of fine clay and ground bricks, mixed up with water, or preferably with a solution of borax, answers well for most purposes. *As a coating for vessels*, to preserve them from injury from exposure to the fire, nothing is better than a mixture of ordinary pipeclay and horse dung, made into a paste with water. This composition is used by the pipe-makers, and will stand unharmed the extremest heat of their kiln for 24 hours. It is applied by spreading it on paper.

LUTEOLINE. This name has been given to a yellow coloring matter, discovered by Chevreul in weld. It is crystalline and volatile.

MACARONI. This only differs from vermicelli in the size of the pipes, which are about as large as a goose quill. A pleasant dish may be made by boiling macaroni in water until soft, either with or without salt, draining off the water, and then stewing it with a little butter, cream, and grated cheese, adding spice to palate. It may be made into a form and browned before the fire.

MACARONS, CREME DE. *Prep.* Clean spirit at 24 u. p. (about 0·945) 2 gallons; bitter almonds, blanched and bruised, 1 lb.; cloves, cinnamon, and mace, in coarse powder, of each 1½ dr.; infuse for 10 days, filter, and add white sugar 8 lbs.; dissolved in pure water 1 gallon. Color violet, with infusion or tincture of litmus and cochineal. An agreeable nutty flavored cordial, but from containing so much bitter almonds, should be drunk with caution. The English use only half the above quantity of almonds.

MACAROONS, ENGLISH. *Prep.* Sweet almonds 1 lb.; blanch, beat to a paste, add lump sugar 1¼ lb.; whites of 6 eggs; the grated yellow peel of 2 lemons; mix well, make into forms, cover with wafer paper, and bake in a moderate heat.

MACERATION. *Syn.* EINWEICHEN, (*Ger.*) MACERATION, (*Fr.*) MACERATIO, (*Lat.*, from *macero*, to soften by water.) In CHEMISTRY and PHARMACY, the infusion of a substance in water, for the purpose of extracting the portion soluble in that menstruum. The word is also frequently applied to the infusion of organic substances in alcohol, ether, or water, either alkalized or acidulated.

MACKEREL. This fish is very apt to disagree with the stomach, and occasionally induces symptoms resembling those of poisoning. It keeps worse than any other fish. It is in season in May, June, and July. (See FISH.)

MADDEN'S VEGETABLE ESSENCE, (CONCENTRATED.) Compound infusion of roses, made strongly acidulous by the addition of more acid. It is astringent and refrigerant.

MADDER. *Syn.* DYER'S MADDER. RADIX RUBIA. RADIX RUBIÆ TINCTORUM, (*Lat.*) GARANCE, (*Gr.*) FARBERRÖTHE, (*Ger.*) The root of the rubia tinctorum, (Linn.) The best madder has the size of a common goose quill, a reddish appearance, and a strong odor. As soon as the roots are taken from the ground they are picked and dried; and before use, they are ground in a mill. Levant, Turkey, and Smyrna madder, is imported *whole*,—French, Dutch, and Zealand madder *ground*. The finest quality of ground madder is called "*crop*" or "*grappe*;" "*ombro*" and "*gemens*" are inferior sorts, and "*mull*" the worst.

Madder contains several distinct principles; as *madder red*, (see ALIZARINE,) *madder purple*, (see PURPURIN,) *madder orange*, a substance very soluble in ether and in hot alcohol; *madder yellow*, very soluble in water and alcohol; *madder brown*, a substance but little known.

Uses. Madder has been given in jaundice and rickets, and as an emmenagogue. *Dose.* ½ dr. to 2 dr. twice or thrice a day. It is principally employed as a dye stuff. (See RED DYES.)

MAGISTERY. *Syn.* MAGISTERIUM, (*Lat.*, from *magister*, a master.) A term formerly applied to precipitates obtained by diluting certain solutions with water; as *magistery* of *bismuth*, trisnitrate of bismuth, which is prepared by adding water to a solution of bismuth in nitric acid. The following are the principal substances to which this term has been applied:—*Magisterium marcasitæ*, trisnitrate of bismuth.—*Ludolph's magistery of opium*, (magisterium opii Ludovici,) prepared by precipitating an acetic solution of opium with subcarbonate of potash, filtering, and drying the precipitate;—*magistery of alum*, hydrate of alumina;—*magistery of diaphoretic antimony*, (materia perlata,) the precipitate obtained by adding an acid to the water used to wash diaphoretic antimony;—*magistery of lapis calaminaris*, hydrated oxide of zinc.

MAGNES ARSENICALIS. Arsenical magnet. *Prep.* Common antimony, sulphur, and white arsenic, equal parts; mix and fuse together till they form a kind of glass. Corrosive. Once used as a caustic.

MAGNESIA. *Syn.* OXIDE OF MAGNESIUM. CALCINED MAGNESIA. BURNT DO. CAUSTIC DO. TALC EARTH. BITTER DO. MAGNESIE; MAGNESIE CAUSTIQUE, (*Fr.*) TALKERDE; BITTER ERDE; GEBRANNTE MAGNESIA, (*Ger.*) MAGNESIA CALCINATA. DO. USTA. (P. L. 1788.) MAGNESIA. (P. L. E. & D.) A light, white substance, classed with the earths. It occurs both in the organic and inorganic kingdoms. It was discovered, or at least first chemically distinguished from lime, by Dr. Black, in 1755. The ancient chemists applied the term *magnesia* to substances that they conceived to have the power of abstracting any principle from the air. Thus an earth, which on exposure to the air increased in weight and yielded vitriol, they called *magnesia vitriolata*. For a similar reason, because nitrous acid was separated during the old process for obtaining magnesia, it was called *magnesia nitri*, and afterwards from its color, *magnesia alba*. Pure magnesia (calcined) is properly the oxide of the metal *magnesium*,—*carbonate of magnesia*, the same oxide combined with carbonic acid, and *sulphate of magnesia*, (Epsom salts,) the same oxide combined with sulphuric acid or oil of vitriol.

Prep. (P. L. E. & D.) Expose carbonate of magnesia in a crucible to a full red heat for 2 hours, or till the powder suspended in water does not effervesce on the addition of muriatic acid.

Remarks. On the large scale, covered crucibles made of porous earthenware, are employed as the containing vessels, and the heat is applied by placing them in a sort of furnace, or rather oven,

heated with coke. The process is known to be complete when the magnesia presents a peculiar luminous appearance. *Product.* About 50§.

Prop., Uses, &c. A very light, white, odorless, tasteless powder; sp. gr. 2·3; when moistened it slightly acts on turmeric paper; soluble in 5,142 parts of cold water, and in 36,000 parts of hot water. It slowly absorbs carbonic acid from the atmosphere. With the acids it forms salts, most of which may be made by the direct solution of the earth, or its hydrate or carbonate. As a medicine it is antacid and laxative, and is exhibited in heartburn, diarrhœa, constipation of children, &c. Its continued use is not unaccompanied with danger, as instances are recorded in which it has accumulated in the intestines, and produced serious inconvenience. *Dose.* As an antacid, a teaspoonful; as a purgative, ½ dr. to 2 dr. or more. Combined with rhubarb it is a favorite purge for infants.

Pur. "It dissolves in hydrochloric acid without effervescence. Neither bicarbonate of potassa, nor chloride of barium, throws down any thing from the solution. It turns turmeric paper brown" (P. L.) when moistened. "Fifty grains are entirely soluble in muriatic acid f℥j; an excess of ammonia occasions in the solution only a scanty precipitate of alumina: the filtered liquid is not precipitated by oxalate of ammonia." (P. E.)

Tests. Magnesia is precipitated—1. As a bulky white hydrate, by pure alkalis.—2. As a bulky white carbonate, by the carbonates of potassa and soda. Both the above precipitates dissolve in nitric and muriatic acid, forming salts which are very deliquescent, and soluble in alcohol.—3. Solutions of magnesian salts are not precipitated by the alkaline sulphates or sulphuric acid, and when dilute by oxalate of ammonia. By these tests it may be distinguished, and separated from lime.

MAGNESIA, CARBONATE OF. *Syn.* SUBCARBONATE OF MAGNESIA. MAGNESIA ALBA, (P. L. 1788.) MAGNESIÆ SUBCARBONAS, (P. L. 1824.) MAGNESIÆ CARBONAS, (P. L. E. & D.) COMITISSÆ PALMÆ PULVIS. CARBONATE DE MAGNESIE, (*Fr.*) KOHLENSAURE MAGNESIA, (*Ger.*) *Prep.* I. (P. L.) Epsom salts lb. iv; carbonate of soda lb. iv, ℥viij; water 4 gallons; dissolve the salts and soda, each separately in one half the water, strain, mix and boil the liquors, constantly stirring for 15 minutes; after subsidence decant the clear, wash the precipitate with boiling water, and dry it. The formula of the P. E. is essentially the same, but the P. D. orders carbonate of potash instead of soda.

II. Add a solution of carbonate of potassa or soda to the bittern of the sea salt works, and well wash and dry the precipitate as before. Both the preceding processes yield the *light carbonate of magnesia* of commerce.

III. (*Heavy carbonate of magnesia. Magnesia ponderosa.*)—*a.* Saturated solution of Epsom salts 1 part; water 3 parts; heat to the boiling point, then add cold saturated solution of carbonate of soda 1 part, (all by measure;) boil, with constant agitation, till effervescence ceases, then add boiling water 100 parts, agitate well, decant off the clear liquid, drain and wash the precipitate with hot water, in a linen cloth, and finish the drying by heating it in an iron pot. *Product*, very superior.

b. Epsom salts 12 parts; crystallized carbonate of soda 13 parts; dissolve each separately in as little cold water as possible, then heat separately each solution to the boiling point, mix and boil till effervescence ceases; wash and dry, as before. *Product*, superior.

Remarks. The carbonate of magnesia of commerce is usually made up into cakes or dice, while drying, or is permitted to drain and dry in masses, which are then cut into shapes with a thin knife. It is powdered by rubbing it through a wire sieve.

Prop., Uses, &c. Carbonate of magnesia is a white, inodorous, tasteless powder, possessing similar properties to calcined magnesia. *Dose.* As an antacid, ½ to a whole teaspoonful 3 or 4 times daily; as a laxative, ½ dr. to 2 dr. It is commonly taken in milk. It is apt to produce flatulence, but in other respects is preferable to calcined magnesia. An ounce measure is filled by 48 grs. of the *light*, and 160 grs. of the *heavy* carbonate, lightly placed in it.

Pur. "The distilled water it has been boiled in should not discolor turmeric paper. The addition of chloride of barium, or nitrate of silver, effects no precipitation. By solution in dilute sulphuric acid, 100 parts lose 36·6 parts, by weight. When the effervescence has ceased, bicarbonate of potassa produces no precipitate." (P. L.)

MAGNESIA, CITRATE OF. *Syn.* MAGNESIÆ CITRAS. *Prep.* Saturate a solution of citric acid with carbonate of magnesia, (about 20 grs. of acid to 14 grs. of the base.) It is usually drunk while effervescing. A pleasant saline draught.

Remarks. The dry white powder sold as citrate of magnesia in the shops, is quite a different preparation to the above, and *does not contain* 1 *particle of citric acid.* The following formula is that of a wholesale London drug house that does largely in this article:—

Calcined magnesia 1¼ lbs., (or carbonate 2 lbs.;) powdered tartaric acid 1½ lbs.; bicarbonate of soda 1 lb.; dry each article by a gentle heat, then mix, pass the mixture through a sieve, and keep it in well-corked bottles. Some persons add a few drops of essence of lemon, and 3 lbs. of finely-powdered sugar to the above quantity. This addition renders it more agreeable.

MAGNESIA, HENRY'S. This is ordinary carbonate of magnesia, the washing of which has been finished with a little rose water.

MAGNESIA, SULPHATE OF. *Syn.* PHYSICAL SALT. EPSOM SALTS. VITRIOLATED MAGNESIA. BITTER PURGING SALT. SAL EPSOMENSIS. SAL CATHARTICUS AMARUS. SAL ANGLICUM. SAL SEIDLITZENSE. SAL CATHARTICUM. MAGNESIA VITRIOLATA. MAGNESIÆ SULPHAS, (P. L. E. & D.) SULPHATE DE MAGNESIE, (*Fr.*) BITTERSALZ; ELSAMERSALZ; SCHWEFELSAURE MAGNESIA, (*Ger.*) This salt is only prepared on the large scale, either from *magnesian limestone* or *bittern.*

Prep. I. (*From Dolomite or magnesian limestone.*)—*a.* Heat the mineral with sufficient dilute sulphuric acid to convert all its *carbonate* into *sulphate* of lime, wash out all the sulphate of magnesia with hot water, and, after defecation, evaporate and crystallize.—*b.* Dissolve out all the carbonate of lime with muriatic acid, then well wash with water, and dissolve the remaining carbonate of magnesia in dilute sulphuric acid, and proceed

as before. This method is very economical where muriatic acid can be obtained almost gratuitously, as in the neighborhood of soda works.—*c.* Instead of sulphuric acid employ sulphate of iron to neutralize the magnesia.

II. (*From bittern.*) *a.* Boil the residual liquor, or mother-water of sea salt, for some hours, skim, and decant the clear, then concentrate by evaporation, and run the solution into wooden coolers; in 1 or 2 days ⅓ part of Epsom salts will have crystallized out. This is called "*singles.*" By re-solution in water, and recrystallization, "*doubles,*" or Epsom salts, fit for the market, are obtained. Bittern yields about 5 parts of sulphate of magnesia for every 100 parts of common salt that have been previously obtained from it.

b. Boil a sufficient quantity of calcined magnesian limestone in bittern, to displace the muriatic acid from the magnesia; evaporate as before. This is the most economical process.

Prop., Uses, &c. Sulphate of magnesia is an excellent cooling purgative, and sometimes proves diuretic and diaphoretic. *Dose.* ½ oz. to 1½ oz. as a purgative or antidote in poisoning by lead. Large doses should be avoided. Dr. Christison mentions the case of a boy 10 years old, who swallowed 2 oz. of salts, and died within 10 minutes. (Treatise on Poisons.) A small quantity of Epsom salts, largely diluted with water, (as a drachm to ½ pint or ¾ pint,) will usually purge as much as the common dose. This increase of power has been recently shown by Liebig to result rather from the quantity of water than the salt. *Pure* water is greedily taken up by the absorbents; but water holding in solution saline matter is rejected by those vessels, and consequently passes off by the intestines.

Pur. Pure Epsom salts are soluble in their own weight of water at 60° F., by which they may be distinguished from Glauber salts, which are much less soluble. Shaken in the cold with water and carbonate of baryta or lime, an alkaline solution of carbonate of soda will be obtained if Glauber salts be present in the sample. When digested in alcohol, the filtered liquid should not yield a precipitate with nitrate of silver, and should evaporate without residue. "Sulphuric acid dropped into the solution should not expel any fumes of hydrochloric acid. 100 grs. dissolved in water, and mixed with a boiling solution of carbonate of soda, yield 34 grs. of carbonate of magnesia when dried." (P. L.)

Caution. Epsom salts and oxalic acid may be readily distinguished from each other by the following properties:—

EPSOM SALTS.	OXALIC ACID.
Taste bitter.	*Tastes* sour.
Odorless.	*Smells* slightly nitrous, (generally.)
Turn opaque and white when dissolved and mixed with carbonate of soda or potassa.	*Effervesces* when mixed with carbonate of soda or potassa, and the liquid afterwards becomes transparent.
Do not alter vegetable blues	*Turns* vegetable blues red.
Have no action on ink spots or iron-moulds.	*Removes* ink spots and iron-moulds.

MAGNESIAN APERIENT. *Prep.* Epsom salts 2 lbs.; dry by a gradually increased heat, powder, add tartaric acid (also dried) 1¼ lb.; calcined magnesia ½ lb.; finely-powdered white sugar 3 lbs.; bicarbonate of soda (dried without heat) 1 lb.; essence of lemon 1 dr.; mix well, rub it through a sieve, in a *dry* situation, put it into bottles, and cork down immediately. *Dose.* ½ to 2 dessert-spoonfuls thrown into a tumbler 3 parts filled with water, rapidly stirred, and drank while *effervescing*, early in the morning fasting, or between breakfast and dinner. An excellent medicine for habitual constipation and stomach complaints.

MAGNESIUM. The metallic base of the earth magnesia. The existence of this metal was demonstrated by Sir H. Davy in 1808, but was first obtained in sufficient quantity to examine its properties, by Bussy in 1830.

Prep. Introduce 5 or 6 pieces of potassium about the size of peas, into a glass tube retort, and over the potassium lay a sufficient number of small fragments of chloride of magnesium to cover it. The latter must then be heated to near its point of fusion, when the flame of the lamp must be applied to the potassium, so that its vapor may pass through the stratum of heated chloride. As soon as the vivid incandescence that follows is over, throw the mass into water, and collect the insoluble metallic portion.

Prop., &c. Color and lustre resemble silver, malleable and fusible at a red heat, unaffected by dry air and water; burns with brilliancy in oxygen gas, yielding *oxide or protoxide of magnesium*, or *magnesia*, and inflames spontaneously in chlorine, yielding *chloride* of *magnesium*. It dissolves in the acids with the evolution of hydrogen gas, and pure salts of magnesia result. *Chloride of magnesium* is best prepared by dissolving magnesia in muriatic acid, evaporating to dryness, adding an equal weight of muriate of ammonia, projecting the mixture into a red-hot platinum crucible, and continuing the heat till a state of tranquil fusion be attained. (Liebig.) On cooling it forms a transparent, colorless, and very deliquescent mass. *Iodide, fluoride*, and *bromide* of *magnesium* may be prepared by dissolving magnesia in hydriodic, hydrofluoric, and hydrobromic acids.

MAHOGANY STAIN. *Prep.* I. Pure Socotrine aloes 1 oz.; dragon's blood ½ oz.; rectified spirit 1 pint; dissolve, and apply 2 or 3 coats to the surface of the wood; finish off with wax or oil tinged with alkanet.

II. Wash over the wood with strong aquafortis, and when dry, apply a coat of the above varnish; polish as last.

III. Logwood 2 oz.; madder 8 oz.; fustic 1 oz.; water 1 gallon; boil 2 hours, and apply it several times to the wood boiling hot; when dry, slightly brush it over with a solution of pearlash 1 oz., in water 1 quart; dry and polish as before.

MAHOGANY FURNITURE. Stains and spots may be taken out of mahogany furniture by the use of a little aquafortis, or oxalic acid and water, by rubbing the part with the liquid, by means of a cork, till the color is restored; observing afterwards to well wash the wood with water and to dry and polish as usual.

MALEIC ACID A peculiar acid obtained

by distilling malic acid with a quick fire; a solution of maleic acid passes over into the receiver, from which crystals may be obtained by evaporation. It is soluble in water, alcohol, and ether, and possesses a sour taste. Heat resolves it into water and *anhydrous maleic acid*. If kept long fused at a low temperature, it passes into a crystalline mass of *fumaric* acid. It forms salts with the bases termed *maleates*, which are mostly insoluble.

MALIC ACID. *Syn.* ACIDE MALIQUE, (*Fr.*) AEPFELSAURE, (*Ger.*) ACIDUM MALICUM, (*Lat.*) *Prep.* (Winkler.) Juice of the fruit of the mountain ash, (sorbus aucuparia,) immediately after it has turned red, but still unripe, q. s.; heat it to the boiling point, skim, filter, nearly neutralize with ammonia, and precipitate with a solution of 1 part of acetate of lead to every 72 parts of juice; filter, and again precipitate with nitrate of lead; allow the whole to stand until it forms a mass of crystals, then well wash, dry, powder, suspend in water, and decompose by a current of sulphureted hydrogen; again filter, neutralize with ammonia, decolor with animal charcoal, a second time precipitate with nitrate of lead, and decompose the resulting nitrate of lead by sulphureted hydrogen; lastly, filter, evaporate, and crystallize. *Product.* 6 oz. of crystallized malic acid from 296 oz. of juice.

Remarks. Liebig first converts the impure solution of the acid into *acid* malate of ammonia by neutralizing one half, and mixing it with the other half unneutralized. This salt forms larger crystals than the neutral malate, and is easier decolored. Mr. Everett has lately proposed the juice of the leaf-stalks of garden rhubarb as a source of malic acid. One imperial gallon of this juice contains 11,139¼ grs. of dry malic acid. The stalks should be peeled before pressing out the juice, as the cuticle contains much color. 20,000 grs. of the peeled stalks yield 12,500 grs. of juice. Mr. Everett's process is as follows:—neutralize with hydrate of lime, boil, filter, precipitate with nitrate of lead, allow it to stand for a few hours, boil, cool, filter, decompose the precipitate with sulphuric acid, avoiding excess, throw down the excess of lead from the supernatant portion with sulphureted hydrogen, evaporate, and crystallize. (Proc. of the Chem. Soc.)

Prop., &c. Malic acid is very soluble in water, has a pleasant acidulous taste, and, when neutralized with the bases, forms salts called *malates*. When kept fused for some time at a low heat, it is converted into *paramalic* or *fumaric acid;* and when quickly distilled, it yields *malic acid*, while fumaric acid is left in the retort. Malic acid may also be obtained from the juice of apples, and several other sorts of fruit.

MALT. *Syn.* MALT, (*Fr.*) MALZ, (*Ger.*) BYNE. BOARIUM; MALTUM, (*Lat.*) Βύνη, (*Gr.*) Grain which has become sweet in consequence of incipient germination. Barley is the grain usually malted, and the process consists in exposure to warmth and moisture. The grain is steeped in water contained in large wooden or stone cisterns, for a period of from 40 to 60 hours, depending on the temperature of the weather, or until it becomes sufficiently swollen and soft enough to be easily pierced with a needle, or crushed between the thumb and finger without yielding a milky juice. As soon as the grain has been sufficiently soaked, the water is drawn off, and the swollen barley is laid upon the stone floor of a suitable apartment called the *couch*, to the depth of 12 to 16 inches, where it is allowed to remain till the *acrospire*, or rudiments of the *plumula*, shoot forth. During the period the grain remains in the couch, it is at first turned every 24 hours, and afterwards 2 or 3 times a day, and at each turning the layer is spread out more and more till it is reduced to the depth of about 3 or 4 inches. The sprouted grain is next removed to the malt kiln, and dried in a thin layer, at a temperature of from 90 to 100° F., until quite hard. It now constitutes *pale malt;* when all the moisture has exhaled, and the heat is raised to from 120 to 125°, *yellow*, or *amber malt*, is formed; and when the heat is further raised to from 145 to 165°, *amber brown*, or *pale brown malt*, is obtained. When the grain is dried at a still higher temperature, it forms *brown malt;* and when the heat is sufficient to blacken or discolor it, it is known as *patent malt*. In the preparation of the last variety, the heat is sometimes pushed as high as 430 to 435° F. By the process of drying, the vitality of the seed is destroyed. Both brown and patent malts are merely employed to color the worts produced from pale malt. 1 lb. of patent malt, mashed with 79 lbs. of pale malt, will impart to the liquor the color and flavor of *porter*. The paler varieties of malt contain the largest quantity of saccharine matter. After the malt has been kiln-dried, the acrospire and roots may be removed by means of a sieve. Before malt is mashed for beer, it is ground in a mill. *Product.* Good barley yields 80§ by weight, and 109§ by measure, of dried and sifted malt.

CHOICE. Good malt should have an agreeable smell, and a sweet taste, should be round and full in the grain, and should be moderately brittle between the teeth. The admixture of *unmalted* with *malted* grain may be discovered by throwing a little into water;—*malt* floats on water, but *raw barley* sinks.

Uses, &c. Malt is chiefly employed in the arts of brewing and distillation. An infusion or decoction of malt (sweet wort) is laxative, and has been recommended as an antiscorbutic and tonic. It has been given with advantage in scurvy. (See BREWING, DISTILLATION, FERMENTATION, &c.)

MALT LIQUORS. *The qualities of ale, beer, and porter, as beverages*, and the methods of preparing them, have been already described, (see ALE, BEER, BREWING, MUM, PORTER, &c.;) the present article will therefore be confined to a short notice of the *cellar management*, and the *diseases of malt liquors generally.*

Bottling. Clean, sweet, and dry bottles, and sound and good corks, should be had in readiness. The liquor to be bottled should be perfectly clear; and if it be not so, it must be submitted to the operation of "*fining*." When quite fine, and in good condition, the bung of the cask should be left out all night, and next day the liquor should be put into bottles, which, after remaining 24 hours merely covered with sheets of paper to keep out flies and dust, must be securely corked down. Porter is generally wired over. If the liquor is intended for exportation to a hot climate, the bottles should remain filled for three days or more before corking them. The stock of bottled liquor should be stored

in a cool situation, and a *small quantity* to meet present *demands* should also be set on their sides in a warmer place to ripen. *October beer* should not be bottled before midsummer, nor *March beer* till Christmas.

Ripening. The addition of a small lump of white sugar to each bottle of ale or beer, and a teaspoonful of moist sugar to each bottle of porter at the time of corking, will render it fit for drinking in a few days in ordinary weather. A raisin or lump of sugar candy is often added to each bottle with a like intention. The Parisians bottle their beer one day, and sell it the next. For this purpose, in addition to the sugar as above, they add 2 or 3 drops of yeast. Such bottled liquor must, however, be drunk within a week, or else stored in a very cold place, as it will otherwise burst the bottles, or blow out the corks.

Age. The addition of a *very little* diluted sulphuric acid to new beer will give it the appearance of being 1 or 2 years old. Copperas, alum, sliced lemons, Seville oranges, and cucumbers, are also frequently employed by brewers for the same purpose. These additions subject the public brewer and seller to a fine, but private persons may employ them at pleasure.

Heading. This is added to thin and vapid beer to make it bear a frothy head. (See HEADING, p. 350.)

Preservation. See the end of the article BREWING.

Improving. Cut half a quartern loaf into slices, toast them brown, place them in a coarse linen bag, along with 2 oz. of hops, and 1 oz. each of bruised ginger, cloves, and mustard seed, suspend the bag by means of a string a few inches below the surface of the beer, and bung close. For a hogshead.

Cloudiness. Add a handful of hops, boiled in 1 gallon of the beer, and in a fortnight fine it down.

Sourness. Add a little powdered chalk or carbonate of soda to the beer, until the acidity is nearly removed, then rummage in 4 or 5 lbs. of moist sugar or treacle to every hogshead. Such beer should be soon put on draught, as it is apt to get flat by keeping. Oyster and egg shells are also frequently used by brewers for the same purpose.

Vamping. Half fill casks with the old liquor, fill them up with some newly brewed, and bung close for 3 weeks or a month.

Mustiness. To each hogshead add 1 lb. of new hops boiled in a gallon of the liquor, along with 7 lbs. of newly-burnt charcoal coarsely bruised, and a 4 lb. loaf of bread cut into slices and toasted rather black; rouse well every day for one week, then rummage in moist sugar 3 or 4 lbs., and bung down for a fortnight.

Flatness. Rummage a few pounds of moist sugar or treacle (foots) into each hogshead; fermentation will ensue in a few days, and the liquor become brisk. On the small scale, the addition of a few grains of carbonate of soda or prepared chalk to each glass will make the liquor brisk and carry a head; but it must be drunk within a few minutes, else it becomes again flat. This is an excellent method when home-brewed beer becomes sour and vapid

Recovering. This is said of unsaleable beer when rendered saleable, by giving it "*head*" or removing its "*tartness*."

Frosted beer is best recovered by the addition of a few hops boiled in a little sweet wort; or by adding a little moist sugar or treacle to induce a fresh fermentation.

Foxing or bucking. Add some fresh hops, along with some bruised mustard seed, to the beer. Some persons add a little *made mustard*, or solution of alum or catechu, or a little diluted sulphuric acid, and rummage well; and in a week or 10 days afterwards, further add some bean-flour, treacle, or moist sugar.

Ropiness. Add a little infusion of catechu and some fresh hops to the beer, and in a fortnight rummage well, and the next day fine it down.

MANDARINS, THE DELIGHT OF THE. *Prep*. Spirit, 22 u. p., 1 gallon; water ½ gallon; white sugar 4 lbs.; anisum chinæ and ambrette or musk seed, (hibiscus abelmoschus,) of each, bruised, ½ oz.; safflower ¼ oz.; place the whole in a carboy or stone bottle capable of holding double, cork close, and agitate well every day for a fortnight, then decant and strain. A pleasant cordial liqueur.

MANGANESE. *Syn*. MANGANIUM; MANGANESIUM, (*Lat.*) MANGANESE, (*Fr.*) MANGAN; BRAUNSTEINMETAL, (*Ger.*) A hard, brittle, grayish-white metal, having the sp. gr. 8·013, discovered by Gahn in the black oxide of manganese of commerce.

Prep. Reduce oxide of manganese to fine powder, make it into a paste with oil, place the mixture in a Hessian crucible lined with charcoal, lute on the cover, and expose it to the strongest heat of a smith's forge for 2 hours.

Prop., Uses, &c. Manganesium unites with oxygen, forming 5 oxides and 2 acids, and with chlorine, fluorine, and sulphur, forming *chlorides*, *fluorides*, and *sulphurets*. The *protoxide* or *green* oxide ($Mn + O$) is formed when either of the other oxides of manganese is mixed with charcoal, and exposed in a covered crucible to a white heat for some time. It possesses strong basic properties, and readily dissolves in the liquid acids, forming salts. The *sesquioxide*, or second oxide, ($2\,Mn + 3O$,) is brown or brownish-black, and is found ready formed in the mineral kingdom. It is the residuum left in the retort when the black oxide is heated to moderate redness in the process of making oxygen gas. The *peroxide*, or third oxide, ($Mn + 2O$,) is the well-known black oxide, or *binoxide* of commerce, and is also found in the mineral kingdom. (See MANGANESE, BLACK OXIDE OF.) The *red*, or fourth oxide, (oxidum manganoso-manganicum, $3\,Mn + 4O$,) is another natural oxide of manganese. It may be prepared artificially, by exposing the peroxide or sesquioxide to a white heat. *Varvacite* ($4\,Mn + 7O$) is another oxide which occurs as a mineral production. *Manganic*, or *Manganescous acid*, ($Mn + 3O$,) is formed when nitre, potassa, or carbonate of potassa, is heated to redness along with black oxide of manganese, either in close or open vessels. It has never been isolated. *Manganesic*, or *permanganic acid*, ($2\,Mn + 7O$,) may be obtained by mixing 8 parts of peroxide of manganese with 7 parts of chlorate of potassa, both in fine powder,

adding 10 parts of hydrate of potassa, dissolved in a small quantity of water, evaporating to dryness, powdering, exposing the powder to a low red heat in a platinum crucible, dissolving the mass in a large quantity of water, decanting, evaporating, and crystallizing. These crystals are *permanganate* of potassa, from which the acid may be obtained by conversion into *permanganate of baryta*, and by careful decomposition by dilute sulphuric acid, (Gregory.) It has a fine red color, bleaches, and is rapidly decomposed by organic matter.—*Protochloride of manganese* is made by heating the chloride to redness in a glass tube, surrounded by an atmosphere of muriatic acid.—*Perchloride* may be obtained by mixing permanganic and muriatic acid, and conducting the evolved gas through a tube cooled to —4° F. It is gaseous at a higher temperature, and is decomposed by moisture.—*Sulphuret of manganese* is a natural mineral production, but may also be procured by igniting a mixture of 1 part of sulphate of manganese and 1 part of charcoal.—*Fluoride of manganese* has been formed by Dumas and Wöhler.

The salts of manganese may all be prepared from the black oxide of commerce by dissolving the latter in muriatic acid, evaporating the solution to dryness, redissolving in water, adding carbonate of soda sufficient to precipitate the iron present, digesting the mixed precipitate in the remainder of the liquid, filtering, adding hydrosulphuret of ammonia till it produces a flesh-colored precipitate, and then precipitating the solution with carbonate of soda. The carbonate of manganese thus obtained, after being well washed in water, may be redissolved in the acids to form salts, most of which are soluble, and many crystallizable.

MANGANESE, BLACK OXIDE OF. *Syn.* Manganese. Binoxide of Manganese. Tritoxide of do., Peroxide of do. Oxide of do. Magnesia nigra. Manganesii binoxydum, (P. L.) Do. oxidum, (P. E. & D.) Oxide de Manganese, (*Fr.*) Braunstein, (*Ger.*) This is the only oxide of manganese that is directly employed in the arts. It is a very plentiful mineral production, and is found in great abundance in some parts of the West of England. The manganese of the shops is prepared by washing, to remove the earthy matter, and grinding in mills. The blackest samples are esteemed the best. It is chiefly used to supply oxygen gas, and in the manufacture of glass and chlorine; in dyeing, and to form the salts of manganese. It has been occasionally employed in medicine, chiefly externally, in itch and porrigo, made into an ointment with lard. It has recently been highly recommended by Dr. Erigeler in scrofula.

Pur. and tests. Heat disengages oxygen. It is almost entirely soluble in muriatic acid. The per centage value of commercial manganese may be readily found by digesting 50 grs. of the sample in muriatic acid 1½ oz., diluted with ½ oz. of water, adding portions of protosulphate of iron from a weighed sample, at first in excess, and afterwards in smaller doses, till the liquid ceases to produce a blue precipitate with red prussiate of potash, and to evolve the odor of chlorine. Heat should be employed towards the end. The quantity of protosulphate used must now be ascertained by weighing the unconsumed portion. If the binoxide be pure, 317 grs. will have been consumed, but if otherwise, the per centage of pure oxide may be obtained by the rule of three; as, suppose only 298 grs. of the sulphate were consumed,

then—as 317 : 100 : : 298 : 94,

and the richness of the sample in pure black oxide would be 94§. The per centage value of the oxide for evolving chlorine may be obtained by multiplying the weight of the consumed sulphate of iron by 0·2588, which, in the above case, would give 76§ of chlorine. Both for this purpose and chlorimetry the sulphate of iron is best prepared by precipitation from its solution with alcohol, and drying it till it loses its alcoholic odor. (Prof. Otto.) See Oxygen and Chlorimetry.

MANHEIM GOLD. *Syn.* Similor. *Prep.* Copper 7 oz.; brass 3 oz.; melt together. Some add tin ½ dr. (See Brass.)

MANNA. A factitious article of manna, made of a mixture of sugar, starch, and honey, with a very small quantity of scammony to give it odor and flavor, and to render it purgative, has been lately very extensively offered in trade.

MANNITE. *Syn.* Manna Sugar. Grenadine. *Prep.* Digest manna in boiling alcohol; as the solution cools, crystals of mannite will form. White, odorless, sweet, soluble in water and alcohol. It is laxative. *Dose.* 1 to 2 drs. for a child; ½ oz. to 1 oz. for an adult. It is found in several other vegetable productions besides manna. Mannite differs from the other sugars in being incapable of undergoing the vinous fermentation.

MANURES. (In Agriculture.) Substances added to soils to increase their fertility. "The food of vegetables, as far as their organic structure is concerned, consists entirely of inorganic compounds; and no organized body can serve for the nutrition of vegetables, until it has been, by the process of decay, resolved into certain inorganic substances. These are carbonic acid, water, and ammonia, which are well known to be the final products of putrefaction. But, even when these are supplied to vegetables, their growth will not proceed unless certain mineral substances are likewise furnished in small quantities, either by the soil, or the water used to moisten it. Almost every plant, when burned, leaves ashes, which commonly contain silica, potash, and phosphate of lime; often, also, magnesia, soda, sulphates, and oxide of iron. These mineral bodies appear to be essential to the existence of the vegetable tissues; so that plants will not grow in soils destitute of them, however abundantly supplied with carbonic acid, ammonia, and water." According to Liebig, the *carbon* of plants is wholly derived from carbonic acid, which is either absorbed from the atmosphere and rain water, by the leaves, or from the moisture and air in the soil by the roots. Its carbon is retained and assimilated with the body of the plant, while its oxygen is given out in the gaseous form; this decomposition being always effected under the action of light at ordinary temperatures. The hydrogen and oxygen of vegetables, which, when combined with carbon, constitute the ligneous, starchy, gummy, saccharine, oily, and resinous matters of plants, are derived from water chiefly absorbed by the roots

from the soil. The nitrogen of vegetables is derived chiefly, if not exclusively, from ammonia, which is supplied to them in rain, and in manures, and which remains in the soil till absorbed by the roots. Ordinary manures may be regarded more valuable according to the quantity of azotized matter which they contain; and also in proportion as the decomposition of quaternary substances acts gradually, and agrees with the progress of vegetation. Thus, it is the azote in combination contained in manures which is especially useful; and the proportion of this, when ascertained, indicates the richness of such substances as fertilizing agents. In reference to the mineral constituents of soils, it appears that a soil is fertile or barren for any given plant according as it contains those mineral substances that enter into its composition. "Thus the ashes of wheat-straw contain much silica and potash, while the ashes of the seeds contain phosphate of ammonia and magnesia. Hence, if a soil be deficient in any one of these, it will not yield wheat. On the other hand, a good crop of wheat will exhaust the soil of these substances, and it will not yield a second crop till they have been restored, either by manure or by the gradual action of the weather in disintegrating the subsoil. Hence the benefit derived from fallows and from the rotation of crops.

"When, by an extraordinary supply of any one mineral ingredient, or of ammonia, a large crop has been obtained, it is not to be expected that a repetition of the same individual manure next year will produce the same effect. It must be remembered, that the unusual crop has exhausted the soil probably of all the other mineral ingredients, and that they also must be restored before a second crop can be obtained.

"The salt most essential to the growth of the potato is the double phosphate of ammonia and magnesia; that chiefly required for hay is phosphate of lime; while for almost all plants potash and ammonia are highly beneficial.

"From the principles above mentioned we may deduce a few valuable conclusions in regard to the chemistry of agriculture. First, by examining the ashes of a thriving plant, we discover the mineral ingredients which must exist in a soil to render it fertile for that plant. Secondly, by examining a soil, we can say at once whether it is fertile in regard to any plants the ashes of which have been examined. Thirdly, when we know the defects of a soil, the deficient matters may be easily obtained and added to it, unmixed with such as are not required. Fourthly, the straw, leaves, &c., of any plant, must be the best manure for that plant, since every vegetable extracts from the soil such matters alone as are essential to it. This important principle has been amply verified by the success attending the use of wheat-straw, or its ashes, as manure for wheat, and of the clippings of the vines as a manure for the vineyard. Where these are used, no other manure is required. Fifthly, in the rotation of crops, those should be made to follow which require different materials; or a crop which extracts little or no mineral matter, such as peas, should come after one which exhausts the soil of its phosphates and potash.

"Of the chemical manures now so much used, *bone-dust* supplies the phosphates which have been extracted by successive crops of grass and corn, the whole of the bones of the cattle fed on these crops having been derived from the soil; its gelatin also yields ammonia by putrefaction. *Guano* acts as a source of ammonia, containing much oxalate and urate of ammonia, with some phosphates. *Nightsoil* and *urine*, especially the latter, are most valuable for the ammonia they yield, as well as for phosphates and potash; but are very much neglected in this country, although their importance is fully appreciated in Belgium and China. *Bran* is a very valuable manure, especially for potatoes, as it contains much of the ammoniaco-magnesian phosphate.

"*Nitrate of soda* probably acts by its alkali replacing potash, but it is possible that its acid may also yield nitrogen to plants, although we possess at present no evidence of this, and, indeed, no evidence that plants can derive their nitrogen from any other source than from ammonia."

Manures may be made of all organic substances, preference being, however, given to those abounding in nitrogen, and which readily decay.

The analysis of manures, soils, and the ashes of plants, for the purpose of ascertaining their composition and comparative value, is not easily performed by the inexperienced chemist; but a rude approximation to their contents, sufficiently accurate for all practical purposes, may be generally made with proper care and attention. See Liebig's Agricultural Chemistry; 7th Edit. of Turner's Chem.; the Memoirs of MM. Boussingault and Payen; and the articles SOILS, AGRICULTURE, FARMING.

MANUS CHRISTI. *Prep.* 1. (*Manus christi perlatæ.*) Drops, or pastilles, made of pearls, sugar, and rose water.—2. (*Manus christi simplices.*) Rose drops, or pastilles, made into flat cakes.

MAPLE SUGAR. Prepared from the juice of the sugar maple, like *birch sugar*. *Average product* from each tree about 6 lbs. per season.

MAPS may be tinted with any of the simple liquid colors mentioned at page 400. To prevent the colors sinking and spreading, which they will usually do on common paper, the latter should be wetted 2 or 3 times with a sponge dipped in alum water, (3 or 4 oz. to the pint,) or a solution of white size; observing to dry it carefully after each coat. This will tend to give lustre and beauty to the colors. The colors themselves should also be thickened with gum. Before varnishing maps after coloring them, 2 or 3 coats of clean size should be applied with a brush. (See CARD WORK and PAPER.)

MARASQUIN DE GROSEILLES. *Prep.* Ripe gooseberries 1 cwt.; black cherry leaves 14 lbs.; bruise, ferment, distil, and rectify the spirit; and to each pint of the product add sugar 1 lb.; dissolved in water 1 pint. A pleasant liqueur.

MARBLE. *Syn.* LIMESTONE. HARD CARBONATE OF LIME. MARMOR; CARBONAS CALCIS DURUS, (P. L.) WHITE MARBLE, (P. E.) MARMOR ALBUM, (P. D.) MARBRE; PIERRE A CHAUX; CHAUX CARBONATEE, (*Fr.*) KALKSTEIN; WEISSE MARMOR, (*Ger.*) White marble is employed for the preparation of carbonic acid, and some of the salts of lime.

Marble is best cleaned with a little clean soap and water, to which some ox-gall may be added. Acids should be avoided. Oil and grease may be

generally removed by following a similar plan to that mentioned at art. BOARDS.

Marble may be stained or dyed of various colors by applying their solutions to the stone made sufficiently hot to make the liquid just simmer on the surface. The following are the substances usually employed for this purpose :—

Blue. Tincture or solution of litmus, or an alkaline solution of indigo ;—*Brown,* Tincture of logwood ;—*Crimson,* A solution of alkanet root in oil of turpentine ;—*Flesh color,* Wax tinged with alkanet root, and applied to the marble hot enough to melt it ;—*Gold color,* A mixture of equal parts of white vitriol, sal ammoniac, and verdigris, all in fine powder, carefully applied ;—*Green,* An alkaline solution or tincture of sap green, or wax strongly colored with verdigris, or stain the stone first blue, and then yellow ;—*Red,* Tincture of dragon's blood, alkanet root, or cochineal ;—*Yellow,* Tincture of gamboge, turmeric, or saffron. *Remarks.* Success in the application of the above colors requires considerable experience. By their skilful use a pleasing effect, both of color and grain, may be produced.

MARBLING OF BOOKS. This is performed by laying the color on the covers or edges with a brush, or by means of a wooden trough and gum water as follows :—Provide a wooden trough, 2 inches deep, 6 inches wide, and the length of a super-royal sheet ; boil in a brass or copper pan any quantity of linseed and water until a thick mucilage is formed ; strain it into the trough, and let it cool ; then grind on a marble slab any of the following colors in small beer. For *blue,* Prussian blue or indigo ;—*red,* rose-pink, vermilion, or drop lake ;—*yellow,* king's yellow, yellow ochre, &c. ; —*white,* flake white ;—*black,* ivory or burnt lampblack ; *brown,* umber, burnt do., terra di sienna, burnt do. ; black, mixed with yellow or red, also makes brown ;—*green,* blue and yellow mixed ;—*orange,* red and yellow mixed ;—*purple,* red and blue mixed. For each color you must have two cups, one for the color after grinding, the other to mix it with ox-gall, which must be used to thin the colors at discretion. If too much gall is used, the colors will spread ; when they keep their place on the surface of the trough, when moved with a quill, they are fit for use. All things being in readiness, the colors are successively sprinkled on the surface of the mucilage in the trough with a brush, and are waved or drawn about with a quill or stick, according to taste. When the design is thus formed, the book, tied tightly between cutting boards of the same size, is lightly pressed with its edge on the surface of the liquid pattern, and then withdrawn and dried. The covers may be marbled in the same way, only letting the liquid colors run over them. The film of color in the trough may be as thin as possible, and if any remains after the marbling, it may be taken off by applying paper to it before you prepare for marbling again. This process has been called FRENCH MARBLING.

To diversify the effect, colors are often mixed with a little sweet oil before sprinkling them on, by which means a light halo or circle appears round each spot. In like manner, spirits of turpentine, sprinkled on the surface of the trough, will make white spots. By staining the book covers with any of the liquid dyes, and then dropping on them, or running over them, drops of liquid mordants, a very pleasing effect may be produced. Thus vinegar black, or a solution of green copperas, let fall or run over common leather, produces black spots or streaks, and gives a similar effect with most of the light dyes. A solution of alum or tin in like manner produces bright spots or streaks, and soda and potash water dark ones. This style has been called *Egyptian marble.*—*Soap marbling* is done by throwing on the colors, ground with a little white soap to a pliable consistence, by means of a brush. It is much used for book edges, stationary, sheets of paper, ladies' fancy work, &c.—*Thread marble* is given by first covering the edge uniformly of one color, then laying pieces of thick thread irregularly on different parts of it, and giving it a fine dark sprinkle. When well managed the effect is very pleasing.—*Rice marble* is given in a similar way to the last by using rice.—*Tree marble* is done on leather, book covers, &c., by bending the board a little in the centre, and running the marbling liquid over it in the form of vegetation. The knots are given by rubbing the end of a candle on those parts of the cover.—*Wax marble* is given in a similar way to thread marble, but using melted wax, which is removed after the book is sprinkled and dried, or a sponge charged with blue, green, or red, may be passed over. This is much used for stationary work, especially folios and quartos. The *vinegar black* of the bookbinders is merely a solution of acetate of iron, made by steeping rusty nails or iron filings in vinegar. All the ordinary liquid colors that do not contain strong acids or alkalis may be used, either alone or thickened with a little gum, for marbling or sprinkling books.—*Sprinkling* is performed by dipping a stiff-haired painter's brush into the color, and suddenly striking it against a small stick held in the left hand over the work. By this means the color is evenly scattered without blotting. (See BOOKBINDING, INKS, LIQUID COLORS, and the *various dyes.*)

MARGARIC ACID. *Syn.* MARGARULIC ACID, (from μαργαριτη, *a pearl.*) A fatty acid obtained by the saponification of oils. *Prep.* I. Dissolve olive oil soap in water, precipitate with a solution of neutral acetate of lead, filter, wash, and dry the precipitate, (margarate of lead,) digest in ether, and decompose the residuum by boiling-hot muriatic acid ; lastly, wash the acid, dissolve in boiling alcohol, and evaporate.

II. Heat hydrated stearic acid with its own weight of nitric acid for some minutes ; press the fatty acid which separates between folds of paper, and purify by repeated crystallizations from alcohol, till its melting point becomes 140° F.

Remarks. Margaric acid forms pearly scales, soluble in ether and alcohol. With the bases, it forms salts called *margarates.*

MARGARINE. *Syn.* MARGARATE OF OXIDE OF GLYCERULE. The solid fatty matter of certain vegetable oils, and the principal ingredient of human and goose fat. A hot alcoholic solution of either of these fats, or of the concrete portion of olive oil, deposites, as it cools, a mixture of *margarate and oleate of glycerule.*

MARGARITIC ACID. Obtained by the saponification of castor oil, along with another oily acid. The former melts at 266°, and forms soapy

salts with the alkalis, (*margaritates;*) the latter is an oily liquid at ordinary temperatures.

MARGARONE. A peculiar fatty substance obtained by distilling a mixture of quicklime and margaric acid. It forms pearly crystalline scales.

MARRIAGE. Dr. Casper, of Berlin, has calculated that the mortality among bachelors, from the age of 30 to 45 years, is 27 per cent., while among married men of the same age it is only 18 per cent. For forty-one bachelors who attain the age of 40 years, there are seventy-eight married men who attain the same age. The advantage in favor of married life is still more striking in persons of advanced age. At 60 years there remain but twenty-two bachelors for forty-eight married men; at 70 years, eleven bachelors for twenty-seven married; and at 80 years, three bachelors against nine married men. (Jour. de Chimie Med.)

MARMALADES. (From *marmello*, Portuguese, *a quince*.) Properly a conserve made of quinces and sugar. The term is now, however, commonly applied to other fruit conserves made by cooks and confectioners. Marmalades are either made by pounding the pulped fruit in a mortar with an equal or a larger quantity of powdered white sugar, or by mixing them together by heat and passing them through a hair sieve while hot, and then putting them into pots or glasses. The fruit pulps are obtained by rubbing the fruit through a fine hair sieve either at once, or after it has been softened by boiling. When heat is employed in mixing the ingredients, the evaporation should be continued until the marmalade jellies on cooling. (See CONSERVES, CONFECTIONS, ELECTUARIES, JAMS, and JELLIES.) The following are the chief marmalades met with in the shops:—

Apricot marmalade, from equal parts of pulp and sugar.

Barberry marmalade, from equal parts of pulp and sugar.

Citron marmalade, made as orange do.

Marmalade of hips, from the pulp of the hips of rosa systyla or arvensis, and sugar, in the same way as the confection.

Mixed marmalade, from plums, pears, and apples, variously flavored to palate.

Orange marmalade, from oranges, (either Seville or St. Michael's,) by boiling the peels in sirup until soft, then pulping them through a sieve, adding as much white sugar, and boiling them with the former sirup and the juice of the fruit to a proper consistence. A still finer marmalade is made by melting the confection of orange peel, P. L., either with or without the addition of orange juice, and passing it through a sieve.

Candied orange marmalade, from candied orange peel, boiled in an equal weight each of sugar and water, and then passed through a sieve.

Quince marmalade, (diacydonium,) from quince flesh, or pulp and sugar equal parts; or from the juice, (*miva cydoniorum, gelatina do.,*) by boiling it to one-half, adding an equal quantity of white wine, and two-thirds of sugar, and gently evaporating.

Scotch marmalade. 1. Seville orange juice 1 quart; yellow peel of the fruit, grated; honey 2 lbs.; boil to a proper consistence.—2. Seville oranges 8 lbs.; peel them as thinly as possible, then squeeze out the juice, and boil it on the yellow peels for 1 hour, strain, add white sugar 7 lbs. and boil to a proper consistence.

Transparent marmalade. Orange marmalade, well strained or clarified while hot.

Marmalade of sloes. Conserve of sloes. Astringent.

Tomato marmalade. Like apricot marmalade, adding a few slices of onions and a little parsley.

Wood sorrel marmalade. (Conserva foliorum lujelæ.) Wood sorrel leaves 1 lb.; powdered white sugar 3 lbs.; beat together in a mortar. Pleasant, cooling, and acidulous; has a fine red color.

MARSHALL'S CERATE. *Prep.* (Collier.) Palm oil ℥v; calomel ℥j; sugar of lead ʒss; ointment of nitrate of mercury ℥ij; mix.

MASSICOT. *Syn.* MASTICOT. PROTOXIDE OF LEAD. OCHRA PLUMBARIA FACTITIA. The dross that forms on melted lead exposed to a current of air, roasted until it acquires a uniform yellow color. Used as a pigment. (See LEAD, OXIDES OF.)

MASTICATORIES. *Syn.* PILÆ MASTICATORIÆ. Medicines taken by chewing. They are chiefly used as cosmetics or stimulants.

Prep. 1. (*Indian.*) A mixture of betel leaf, areka nut, and lime.—2. (Hartman.) Mastich and pellitory of Spain, equal parts.—3. (Augustin.) Mastich, white wax, and ginger, equal parts.—4. (Quincy.) Mastich ℥iij; pellitory of Spain and stavesacre seeds, of each ʒij; angelica root ʒss; cubebs and nutmegs, of each ʒj; make into small balls with white wax q. s.—5. Opium, ginger, rhubarb, mastich, pellitory of Spain, and orris root, of each ʒj; musk and ambergris, of each 1 gr.; melted white wax or spermaceti to mix.

MASTICHIC ACID. *Syn.* SOLUBLE MASTICH RESIN. The portion of mastich soluble in alcohol. It forms about 90% of the resin. According to Johnstone, it forms salts with the acids.

MASTICINE. *Syn.* NEUTRAL OR INSOLUBLE MASTICH RESIN. The insoluble portion left from preparing the last article. It is soluble in the alcoholic solution of the preceding resin.

MATTHEW'S PILLS. *Prep.* Extract of black hellebore, powdered myrrh, Castile soap, opium, saffron, and oil of turpentine, equal parts; beat into a mass with sirup of buckthorn. Anodyne; alterative. *Dose.* 3 to 10 grs.

MATHIEU'S VERMIFUGE. This consists of two electuaries; the one for killing the worms, and the other for expelling them.

Prep. 1. Tin filings ℥j; fern root ʒvj; worm seed ʒiv; resinous extract of jalap and sulphate of potash, of each ʒj; honey to mix. *Dose.* A teaspoonful every 3 hours, for 2 days.

2. Jalap and sulphate of potash, of each ℈ij; scammony ℈j; gamboge 10 grs.; honey to mix. *Dose.* A teaspoonful every three hours, until it operates well; the preceding electuary having been previously taken as directed.

MATTICO. The leaves have been employed with considerable success as an external styptic; applied to leech-bites, and pressed on with the fingers, they seldom fail to arrest the bleeding. (Prov. Med. and Surg. Jour., June, 1842.)

MAYDEW. *Syn.* ROS MAJALIS. Collected by sponges off the grass. Used as a cosmetic.

MEAD. *Syn.* VINUM HYDROMELI. (From *meede, Dut.*) An old English liquor, made from the combs from which the honey has been drained

ent, by boiling in water and fermenting. It is commonly confounded with metheglin. (See METHEGLIN.) Some persons add 1 oz. of hops to each gallon; and, after fermenting, a little brandy. It is then called SACK MEAD.

MEALS, RESOLVENT. (QUATUOR FARINÆ RESOLVENTES, *of old pharmacy.*) Barley, bean, linseed, and rye meals.

MEASLES, THE. *Syn.* RUBEOLA. MORBILLI. *Symp.* Feverishness, chilliness, shivering, head-pains, swelling and inflammation of the eyes, defluxion of sharp tears, with painful sensibility to light, oppressive cough, difficulty of breathing, and sometimes vomiting or diarrhœa. These are followed about the fourth day by an eruption of small red points or spots, perceptible to the touch, and which, after four or five days, goes off with desquamation of the cuticle; but the fever, cough, &c., continue for some time.

Treat. When there are no urgent local symptoms, mild aperients, antimonial diaphoretics and diluents should be had recourse to; but when the inflammatory symptoms are emergent, and the lungs are weak, especially in plethoric habits, blood may be taken. The cough may be relieved by expectorants, demulcents, and small doses of opium; and the diarrhœa by the administration of the compound powder of chalk and opium; the looseness of the bowels, however, had better not be interfered with, unless it be extreme.

MEASURE. *Syn.* MENSURA, (*Lat.*) The unit or standard by which we estimate extension, whether of length, superficies, or volume. Our notice must be confined to the imperial measure of England, and the usual French measures that are mentioned in works on the arts and sciences, or are used in prescribing.

I. *French Decimal Measures of Length.*

Names.	Eq. in Mètres.	Inches.	Eq. in English Measures.				
			Miles.	Fur.	Yds.	Feet.	Inches.
Millimètre	0·001	·03937					
Centimètre	0·01	·39371					
Décimètre	0·1	3·93708					
Mètre	1·	39·37079					
Decamètre	10·	393·70790	0	0	10	2	9·7
Hectomètre	100·	3937·07900	0	0	109	1	1·078
Kilomètre	1000·	39370·79300	0	4	213	1	10·3
Myriamètre	10000·	393707·90000	6	1	156	0	9·17

Remarks. The unit of the above table is the mètre, which has been determined to be 39·37079, at 32° F., (Capt. Kater;) the English foot is taken at 62° F. It may be observed that all the divisions and multiples are *decimals*, and hence the term *decimal system* has been given to these measures, as well as to those of a similar description below. It will be perceived that the principle of nomenclature adopted in applying the names, was to prefix the *Greek* numerals to the *decimal multiples*, and the *Latin* numerals to the *decimal subdivisions*.

II. *Measures of Volume.*—1. *Imperial Standard, and the relative value of its Divisions, including those used in Medicine.*

♏ Minims or drops.	fʒ Fluid Drachms.	f℥ Fluid Ounces.	O. Pints.	Oij. Quarts.	C. Gallons.	Pecks.	Bushels.	Quarters.
1	0·01666666	0·00208333	0·00010416	0·00005208	0·00001302	0	0	0
60	1	0·125	0·00625	0·003125	0·00078125	0	0	0
480	8·	1·	0·05	0·025	0·00625	0	0	0
9600	160·	20·	1·	0·5	0·125	0·0625	0·015625	0·001953125
19200	320·	40·	2·	1·	0·25	0·125	0·03125	0·00390625
76800	1280·	160·	8·	4·	1·	0·5	0·125	0·015625
0	2560·	320·	16·	8·	2·	1·	0·25	0·03125
0	0	1280·	64·	32·	8·	4·	1·	0·125
0	0	0	512·	256·	64·	32·	8·	1·

Remarks. The standard unit of the above table is the gallon, which has a capacity equal to 277·274 cubic inches, and is capable of holding exactly 10 lbs. (avoird.) of distilled water at 60° F., and 30 inches of the barometer. It is one-fifth larger than the *old wine gallon*, and one-sixtieth smaller than the *old beer gallon.*

*** A TEA OR COFFEE-SPOONFUL (*cochlearium parvum*) of
sirup contains ʒj to ʒij;
ordinary aqueous fluids ℈iss to ℈ij;
spirits or tinctures ℈j to ℈iss;
light powders (as magnesia) ℈ss to ℈j;
heavy do. (as sulphur) ℈iss to ℈ij;
metallic oxides ʒj to ℈iiij.

A DESSERT-SPOONFUL (*cochlearium mediocre*) of water ʒij.

A TABLESPOONFUL (*cochlearium magnum vel amplum*) of
sirup ℥ss;
ordinary aqueous fluids ʒiij to ʒiiij;
spirits or tinctures ʒij to ʒiij.

A TEACUPFUL (*vasculum pro thea*) ℥iij to ℥iv.

A WINE-GLASSFUL (*scyphus vel cyathus pro vino*) ℥iss to ℥ij.

A THIMBLEFUL (*clypeola metallica pro digitis*) a teaspoonful.

A CUBIC INCH OF WATER weighs 252·456 grs.

A CUBIC FOOT OF WATER weighs 62·3206 lbs. (av.)

A FLUID OUNCE OF WATER contains 1·73298 cubic inches

A TROY OUNCE . . . . 1·9013214 do.

2. *French Decimal Measures of Volume.*

Names	Eq. in Litres.	Eq. in Cubic In.		Measure.	
Millilitre	0·001	0·06112			
Centilitre	0·01	0·61120			
Decilitre	0·1	6·11208		Gallons.	Pints.
Litre	1·	61·12079	=	0	1·76377
Decalitre	10·	611·20792	=	2	1·4464
Hectolitre	100·	6112·07920	=	22	0·2640
Kilolitre	1000·	61120·79208	=	220·47	
Myriolitre	10000·	611207·92080	=	2204·71	

Remarks. The standard unit in the above table is the *litre*, or the cube of the one-tenth of a mètre. The cubic inch is calculated at 252·5 grs. of water at 62° F.

⁂ The French *centiare* contains 1 square mètre; the *are*, 100 do.; the *hectare*, 10,000 do.

†‡† The capacity of solids and aëriform fluids is taken in cubic inches, or feet, in England. In France, the *stere*, or *mètre cube*, equal to 35·31658 English cubic feet, is the standard unit.

MECHLOIC ACID. This name has been given by Couerbe to the crystalline mass obtained by passing chlorine gas over fused meconine. It is purified by removing the chlorine by oxide of silver. Before being purified, blood red; when pure, white crystals, strongly acid.

MECONIC ACID. *Syn.* ACIDUM MECONICUM, (*Lat.*, from μηκων, *a poppy.*) A peculiar acid discovered in opium. *Prep.* Dissolve pure meconiate of potassa 1 part, in 21 parts of hot water, add 3 parts of strong muriatic acid, and mix well. Acid meconate of potassa is deposited as the solution cools, which being treated a second time in the same way, yields pure meconic acid. Meconate of lime may be substituted for the potash salt. Its purity may be ascertained by its leaving no residue when heated in a platinum or glass capsule.

Remarks. Meconic acid forms beautiful pearly scales, possessing a sour astringent taste, and is soluble in water and alcohol. Its solution is decomposed by boiling, and by animal charcoal. At a heat of 248° it is decomposed, and pyromeconic acid formed along with other products. *It is characterized* by—1. Precipitating the sesquisalts of iron *red*, and the color not being destroyed by the action of corrosive sublimate.—2. Precipitating a weak solution of ammonio-sulphate of copper *green.*—3. With acetate of lead, nitrate of silver, and chloride of barium, it gives white precipitates.—4. It is not reddened by chloride of gold. The above precipitates are all *meconates* of the given bases. MECONATE OF LIME is obtained by heating a solution of chloride of calcium with an infusion of opium made with cold water, and collecting the precipitate. By dissolving 1 part of this impure salt in a mixture of 20 parts of water, and 3 parts of strong muriatic acid at near 212°, silvery crystals of monobasic meconate of lime will be deposited as the liquid cools. (Gregory.) The *meconate* of *potassa* may be prepared by direct solution of the base in the impure acid obtained from meconate of lime till the liquor turns green, heat being applied, when the salt crystallizes out as the liquid cools; it may be purified by pressure, and recrystallization.

MECONINE, (from μηκων, *a poppy.*) A white crystalline, odorless solid, discovered by Couerbe in opium. It remains in solution when an aqueous infusion of opium is precipitated by ammonia. It may be obtained by evaporation, and may be purified by alternate solution in alcohol, water, and ether. It forms white prisms. It is distinguished from codeia and morphia by the absence of alkaline properties, and also from the latter by its fusibility, its greater solubility in water, and not being turned blue by the sesquisalts of iron. Chlorine gas passed over fused meconine turns it blood red. Neither meconine nor meconic acid appears to exercise any important physiological action on the human frame.

MEDALS, and similar objects are very conveniently and accurately copied by electricity, (see ELECTROTYPE,) but still more quickly by the following means:—Reduce recently-precipitated and well-washed oxide of copper by means of hydrogen passed over it at a gentle heat; the operation being conducted in a glass tube, the one end being left partially open to permit of the escape of the newly-formed water. The process should be continued till the oxide be wholly decomposed, and the powder assumes a fine copper-red color, when it must be immediately removed, and kept in a well-stoppered bottle. For use, the medal is placed on a layer of smooth sand, at the bottom a small white iron cylinder, and the sifted copper powder poured on to the depth of about 10 or 12 lines, and then gently compressed with a massive iron cylinder, after which the whole must be placed on an anvil, and struck with a heavy hammer till the powder is no farther compressible. The newly-formed cast is then removed from the cylinder, and heated to a red-white heat in a small copper box, well luted with clay to exclude the air, after which the whole is left to cool. A solid copper medal is thus very quickly obtained. The recently reduced oxides of other metals may be substituted for copper G. Osann, the discoverer of

this method, succeeded well with copper, silver, and lead, which were the only ones he tried. (Bibliothèque Universelle de Genève, No. 82.)

MEDECINE NOIR. A celebrated French nostrum, consisting of a mixture of tamarinds, manna, glauber salts, and senna.

MEDULLIN. The porous pith of the sunflower. It is soluble in nitric acid. (Dr. John.)

MEERSCHAUM, (*Ger., foam of the sea.*) *Syn.* ECUME DE MER; MAGNESIE CARBONATEE SILICIFERE, (*Fr.*) A silicated magnesia mineral. The finest qualities are found in Greece and Turkey. It is used by the Tartars for washing linen. Its principal consumption is, however, in the manufacture of tobacco-pipes. The Germans prepare their pipes for sale by first soaking them in tallow, then in white wax, and finally polishing them with shavegrass. *Genuine meerschaum* pipes are distinguished from *mock* ones by the beautiful brown color which they assume after being smoked for some time.

MEGGELLUP. *Syn.* MAGILP. *Prep.* Mastich varnish 1 lb.; pale drying oil 2 lbs.; mix. Used by painters to apply their glazings with. It may be thinned by adding turpentine. Artists often vary the proportions according to their work.

MELAM. A white insoluble powder discovered by Liebig. It is prepared by fusing sulphocyanide of ammonia, or a mixture of 2 parts of sal ammoniac, and 1 part of sulphocyanide of potassium. The residuum in the retort, after being washed with water, is *melam.*

MELAMINE. A basic substance discovered by Liebig. It is prepared by dissolving melam in a mixture of hydrate of potassa 1 part, and water 20 parts, evaporating till crystalline scales begin to form, and slowly cooling. The resulting crystals must be purified by re-solution and recrystallization. Yellow transparent crystals, soluble in hot water. It combines with the acids, and forms crystallizable acidulous salts.

MELAMPYRINE. A tasteless, neutral, crystallizable substance, extracted by Hünefeldt from the melampyrum nemoroeum.

MELANGALLIC ACID. *Syn.* METAGALLIC ACID. Obtained by distilling tannic acid by a quick fire till it froths, melts, and becomes black and solid, then dissolving in an alkali, filtering, and precipitating by an acid. A black powder.

MELANIC ACID. A black powder discovered by Piria, and formed when saliculite of potassa is exposed to the air till it turns black. In this state the mass consists of acetic and melanic acids.

MELASSIC ACID. *Prep.* Pour a hot saturated solution of baryta, or caustic potassa or soda; on melted grape sugar, dissolve, and continue the heat till the mixture turns deep brown, then precipitate with an excess of muriatic acid, and wash the resulting black powder, first with dilute muriatic acid, and then with water.

MELLITIC ACID. Discovered by Klaproth in melilite or honey stone. It may be obtained by boiling the powdered stone in 70 times its weight of water, filtering, evaporating, and crystallizing. It forms salts with the bases termed *melilates.*

MELLON. A compound of carbon and nitrogen, discovered by Liebig. It remains at the bottom of the retort, under the form of a yellow powder, when bisulphocyanide of mercury is exposed to heat. It may in like manner be obtained by exposing melam, ammeline, ammelide, or dry sulphocyanogen to a red heat. It is insoluble in alcohol, water, and dilute acids. It is decomposed by concentrated acids, alkalis, and a strong red heat.

MELTING-BAG. (Dr. Breslau.) *Prep.* Iodide of potassium 10 grammes; sal ammoniac 80 grammes; dry, reduce each separately to fine powder; mix by trituration, and enclose them in a small bag. As a resolvent to indolent tumors. It should be worn on the part for some time.

MENISPERMIC ACID. Boullay has applied this name to a crystalline substance found in cocculus indicus.

MENISPERMINE. *Syn.* MENISPERMIA, MENISPERMINA. A neutral basic substance discovered by Pelletier and Couerbe in cocculus indicus. It may be obtained by the action of alcohol. It is insoluble in water. *Paramenispermine* is another similar substance, but differs from the preceding by not forming salts with the acids. Neither of the above exercise any marked physiological action.

MERCAPTAN, (from its energetic action on mercury.) *Syn.* HYDROSULPHURET OF SULPHURET OF ETHULE. An ethereal liquid, smelling strongly of garlic, discovered by Zeise. *Prep.* Saturate liquor of potassa, sp. gr. 1·28, with sulphureted hydrogen, then mix it with a solution of the same density of sulphovinate of lime. The distilled liquid must be digested, first on a little chloride of calcium, and then agitated and rectified with a little red oxide of mercury.

MERCURY. *Syn.* QUICKSILVER. QUIK. HYDRARGYRUS. MERCURIUS. ARGENTUM VIVUM. AQUA ARGENTEA. AQUA METALLORUM. HYDRARGYRUM, (P. L. E. and D.) MERCURE, MERCURE COULANT, VIF-ARGENT, (*Fr.*) QUECKSILBER, (*Ger.*) Ὑδράργυρος, Ἄργυρος χυτός, (*Gr.*) A liquid metal having a tin white color. Mercury was known to the ancients. It is mentioned by Aristotle, Theophrastus, Pliny, and Dioscorides, but it is not alluded to, either in the Old Testament or in the writings of Herodotus. The principal sources of this metal at the present time are the mines of Idria, in Carniola, and Almaden, in Spain, where it exists under the form of cinnabar, from which the pure metal is obtained by distilling that ore with lime or iron filings in iron retorts, by which the sulphur it contains is seized and retained, while the mercury rises in the state of vapor, and is condensed in suitable receivers. Quicksilver is imported in cylindrical iron bottles, containing from ½ cwt. to 1 cwt. each. An importation of quicksilver was recently made from China.

Prep. Mercury, as imported, is usually very pure. The Dublin College orders it to be prepared for medical purposes by putting 6 parts into a retort and distilling off four parts. The whole of the mercury may, however, be safely drawn over. A strong earthenware or iron retort, with a low neck or tube dipping into a basin of water, may be used for this purpose. One of the quickest and best means of purifying mercury is to agitate it with a concentrated solution of nitrate of mercury, at a heat of 104° F.

Prop. Sp. gr about 13·6; freezes and crys-

tallizes at —39° Fahr.; when solid it is ductile, malleable, and tenacious; boils at 662° Fahr.; but volatilizes slowly at the ordinary temperature of the atmosphere, and when mixed with water at from 140° to 160°, it is volatilized in considerable quantities. (Stromeyer.) It unites with oxygen, forming two oxides; and with chlorine, forming calomel and corrosive sublimate; with the metals it forms amalgams. Its oxides form salts with the acids. The only acids that act on metallic mercury are the sulphuric and nitric; but for this purpose the former must be heated.

Uses. Mercury is applied to various purposes in the arts; as the amalgamation of gold and silver, wash gilding, the silvering of looking-glasses, the manufacture of barometers and thermometers, and in the preparation of several valuable medicines. In its metallic state it appears to be inert when swallowed, unless there be much acidity in the alimentary canal; its salts are, however, all of them more or less poisonous.

Pur. It is totally dissipated by heat, and dissolved by diluted nitric acid, but is insoluble in boiling muriatic acid. The acid poured off, and allowed to cool, is neither colored, nor yields a precipitate with sulphureted hydrogen; sp. gr. 13·5. (P. L.) "A globule moved about on a sheet of paper yields no trail; pure sulphuric acid agitated with it (in the cold) evaporates when heated, without leaving any residuum." (P. E.)

Tests. 1. Metallic mercury may be detected by its volatility, and when in a finely-divided or pulverulent state, by the microscope, or by staining a piece of copper white when rubbed on it, or when heated beneath it.—2. Solutions of the persalts of mercury yield—with caustic alkalis, yellowish or red precipitates—with alkaline carbonates, a brick-red one—with iodide of potassium, a scarlet one.—3. The *protosalts* of mercury yield a gray or black precipitate with alkalis,—a yellowish or greenish-yellow one with iodide of potassium,—a white one with muriate of soda.—4. The salts of mercury are all volatilized at a dull red heat—give a white precipitate with prussiate of potash,—a black one with sulphureted hydrogen and hydrosulphurets,—an orange yellow one with gallic acid, and—with a plate of polished copper, a white coat of metallic mercury. Solid bodies may be tested by treating them with nitric acid, evaporating, redissolving in water, and then proceeding as above.

MERCURY, ACETATE. *Syn.* Hydrargyri Acetas, (P. D.) Do. Acetis. *Prep.* I. (P. D.) Mercury 9 parts; diluted nitric acid 11 parts; dissolve, then add it to a boiling solution of acetate of potash 9 parts, dissolved in water 100 parts, and acidulated with distilled vinegar; filter while hot, let it cool, and wash and dry the crystals that are deposited.

II (P. L. 1788.) Dissolve protoxide of mercury in strong acetic acid, concentrate so that crystals may form as it cools.

Remarks. The above is the *protacetate of mercury*,—the *peracetate* is formed by dissolving the red oxide in strong acetic acid. They both form white scales: said to be one of the mildest of the mercurials. *Dose.* 1 gr. night and morning, gradually increased. The peracetate is the active ingredient in the celebrated *Keyser's pills.* (Robiquet.) A lotion is made with ℈j of the protacetate to a pint of water; and an ointment is prepared by dissolving 2 or 3 scruples in an ounce of olive oil. (Pereira.)

MERCURY, BROMIDES OF. The *protobromide* (hydrargyri bromidum) is a white insoluble powder, obtained by precipitating a solution of protonitrate of mercury by bromide of potassium. The *bibromide* (hydrargyri bibromidum) is formed by dissolving peroxide of mercury in hydrobromic acid.

MERCURY, CHLORIDES OF. *Prep.* I. (*Chloride of Mercury. Mercurius dulcis. Hydrargyrum Muriaticum mite. Drago Mitigatus. Aquila alba. Manna Metallorum. Panchymagogum minerale. Calomelas,* P. E. and D.) See Calomel.

II. (*Bichloride of Mercury. Perchloride of do. Oxymuriate of do. Corrosive muriate of do. Chloride of do.? Muriate of do.? Hydrochlorate of do.? Corrosive Sublimate. White Mercury. Mercurius Corrosivus Sublimatus,* P. L. 1720, 1745. *Hydrargyrus Muriatus,* P. L. 1788. *Hydrargyri Oxymurias,* P. L. 1809, 1824. *Hydrargyri Bichloridum,* P. L. 1836. *Sublimatus Corrosivus,* P. E. *Hydrargyri Murias Corrosivus,* P. D. *Hydrargyri Murias? Do. Hydrochloras? Acidum Chloro-hydrargyricum. Deuto-Chlorure de mercure; Muriate de mercure corrosif,* Fr. *Doppelt-chloric Quecksilber; Aetzendes quecksilber sublimat,* Ger.)

Prep. 1. (P. L.) Mercury lb. ij; sulphuric acid lb. iij; boil together in an iron pot to dryness, and when cold, triturate in a mortar with common salt (dry) lb. iss; then sublime with a heat gradually raised. The Edinburgh form is similar.

2. (P. D.) Persulphate of mercury 5 parts; dried muriate of soda 2 parts; triturate and sublime as above.

Remark. The solution of the mercury is usually made in an iron pot set in a furnace under a chimney to carry off the fumes; and the sublimation is conducted in an earthen alembic placed in a sand bath; or in an iron pot, covered with a semispherical earthen head. Corrosive sublimate may also be made by the direct solution of the red oxide in muriatic acid, or by bringing its constituents together in the state of vapor. The latter plan has been recently patented.

Prop., Uses, &c. The corrosive sublimate of commerce occurs in semitransparent white masses. It possesses a strong coppery taste; is soluble in about 19 parts of cold and 3 parts of boiling water, and in 7 parts of cold and 3½ parts of boiling alcohol. It is also very soluble in ether. The addition of muriatic acid, sal ammoniac, or camphor, increases its solubility in all these menstrua. It is decomposed by contact with metals, and in solution by various organic substances, and by exposure to light. *Dose.* ⅛ to 1 gr. twice a day. It acts quickly, but (it is said) not permanently. It is also used externally as a lotion in some skin diseases. It is given in pills or solution. *It is powerfully poisonous.*

Pur. "It sublimes entirely by heat; and its powder is completely and easily soluble in sulphuric ether." (P. E.) "The yellow or red powder precipitated from its aqueous solution by potash or lime water, emits oxygen by heat, and

runs into globules of mercury. It is totally soluble in water." (P. L.)

Tests. 1. Mixed with potash and heated in a glass tube over a spirit-lamp, metallic mercury sublimes and condenses in globules on the cooler portion of the tube.—2. Lime water and the alkaline carbonates occasion a brick-red precipitate in its solution.—3. Pure alkalis an orange or red one.—4. Iodide of potassium a scarlet one.—5. Sulphureted hydrogen and hydrosulphates a black one.—6. Prussiate of potash a white one. Protochloride of tin a white one, changing into a grayish powder or minute mercurial globules.—7. The alkaline bicarbonates either do not disturb the solution, or only cause a slight degree of opalescence.—8. Drop the suspected solution on a clean piece of gold or copper, (as a coin,) and apply a bright key, so that it may at once touch the edge of the coin and the solution, when a hydro-electric current will be produced, and a white spot of reduced mercury will appear on the surface of the metal. (See ENGRAVING.)

a. A coin.
b. Drop of suspected solution.
c. A bright key.

*** The preceding tests determine the substance examined to be a persalt of mercury; but by filtering the solution, acidulating with dilute nitric acid, and testing with nitrate of silver, we may readily ascertain whether it contained chlorine. If a cloudy white precipitate be formed, and this precipitate be soluble in ammonia water, but insoluble in nitric acid, corrosive sublimate was present in the original compound.

Ant. White of egg, hydrated protosulphuret of iron, and gluten, are all powerful antidotes. White of egg has proved efficacious in numerous cases. (Christison, Ure, Thénard, &c.) It requires the white of one egg to decompose 4 grains of corrosive sublimate. (Peschier.) The recently precipitated protosulphuret of iron is, however, according to M. Mialhe, the antidote *par excellence,* not only to corrosive sublimate, but to the salts of lead and copper. The gluten of wheat has also been recommended, (Taddei,) or what is equally efficacious, wheat flour mixed up with water. When any of the above are not at hand, copious draughts of milk may be substituted. Iron filings have been occasionally used as an antidote. All these substances should be taken in considerable quantities, and the dose should be frequently repeated. Vomiting should in all cases be induced, to remove, if possible, the poisonous matter from the stomach.

MERCURY, FULMINATING. *Syn.* FULMINATE. FULMINATE OF PROTOXIDE OF MERCURY FULMINATE OF MERCURY. *Prep.* I. (Howard.) Mercury 1 part; nitric acid (1·36) 12 parts; dissolve, and pour the solution gradually and cautiously into alcohol of 80 to 85%, 11 parts; a gentle heat being applied; cool, filter, dissolve in boiling water, and again filter; as the solution cools, crystals of fulminate are deposited.

II. (Berzelius.) Mercury 1 part; nitric acid (1·375) 12 parts; dissolve, add to this solution alcohol (0·850) 16·3 parts, (at intervals;) apply heat till the effervescence and cloud of gas disappear, adding gradually on the action becoming violent 16·3 parts more of alcohol. *Product.* 112% of the mercury employed.

III. (Ure.) *a.* Mercury 100 parts; nitric acid (sp. gr. 1·4) 1000 parts, (or 740 by measure;) dissolve by a gentle heat, and when the solution has acquired the temperature of 130° F., slowly pour it through a glass funnel tube into alcohol (sp. gr. 0·830) 830 parts, (or 1000 by measure;) as soon as the effervescence is over, and white fumes cease to be evolved, filter through double paper, wash with cold water, and dry by steam, (not above 212°,) or hot water. The fulminate is then to be packed in 100 gr. paper parcels, and these stored in a tight box or corked bottle. *Product.* 130% of the weight of mercury employed.

b. Quicksilver 1 oz.; nitric acid (1·4) 7½ oz., (fluid;) alcohol (0·830) 10 oz., (fluid.) Proceed as last.

Remarks. Dr. Ure's form is not only the cheapest but the best. That of Berzelius is more expensive and dangerous. There is also "no little hazard in pouring the alcohol into the nitric solution; for at each effusion one explosive blast takes place; whereas, by pouring the solution into the alcohol, as originally enjoined by the Hon. Mr. Howard, the inventor, no danger whatever is incurred." (Ure.) This preparation is used for priming the copper percussion caps for fowling-pieces, muskets, &c. Dr. Ure, in his first report to the Board of Ordnance, recommended the use of a spirituous solution of gum sandarach, as the best substance for diluting the fulminate, and fixing it in the caps; but in a subsequent report to the same board, he states that a solution of mastich in spirit is to be preferred. Less than ½ gr. of the fulminate is sufficient for each cap. The French use a mixture of fulminate 10 parts, and gunpowder 6 parts, made into a dough with water, by grinding them on a smooth marble table with a wooden muller. 2½ lbs. are employed to charge upwards of 40,000 of the French caps.

*** The fulminate should only be dried in small parcels at a time, and those should be placed at a distance from each other. The dreadful explosion at Apothecaries' Hall, by which Mr. Hennel, a talented chemist, lost his life, was occasioned by the spontaneous detonation of fulminating mercury. (See the article FULMINATES, in Ure's Dict. of Arts, &c., which is the most practical and valuable paper on this subject in our language.)

MERCURY, IODIDES OF. *Prep.* I. (*Iodide of mercury. Protiodide of do. Ioduret of do. Hydrargyri iodidum,* P. L. *Do. ioduretum. Proto-iodure de mercure,* Fr. *Quecksilber iodure,* Ger.) 1. (P. L.) Mercury ℥j; iodine ʒv; alcohol q. s.; triturate together; dry in the dark, and keep it in a well-stoppered bottle, (in the shade.) (See BINIODIDE OF MERCURY.)

2. Precipitate a solution of protonitrate of mercury by another of iodide of potassium; wash and dry in the shade. Both the above are greenish yellow powders, soluble in ether. *Dose.* ⅛ to 1 gr and upwards in pills, in scrofula, &c. It is also used externally. It is *very poisonous.*

II. (*Biniodide of mercury. Deutiodide of do. Red iodide of do. Hydrargyri biniodidum*, P. L. & E. *Deuto-iodure de mercure*, Fr. *Doppelt iodi-quecksilber*, Ger.) *Prep.* 1. (P. L.) Mercury ℥j; iodine 3x; alcohol q. s., (2 to 3 drs.;) triturate till the globules of mercury disappear, and the mixture assumes a scarlet color, then dry in the shade, and place it in a well-stoppered vessel.

2. (P. E.) Mercury ℥ij; iodine ℥iss; spirit q. s.; triturate together as last, and dissolve the product in concentrated solution of muriate of soda 1 gallon, by brisk ebullition, filter while boiling hot, and wash and dry the crystals that are deposited as the solution cools.

3. Precipitate a solution of corrosive sublimate, or pernitrate of mercury, by another of iodide of potassium, avoiding excess of either precipitant; wash and dry as before.

Remarks. The last is the more convenient process; but the Edinburgh form gives the most sightly preparation. When large quantities of mercury and iodine are triturated together, however carefully, so much heat is evolved that a considerable portion of the iodine is volatilized, and the operator nearly suffocated with the fumes, by which means the proportions of the ingredients become altered, and the color of the product is consequently inferior. This method should therefore be only adopted on the small scale. It is a bright scarlet powder, soluble in alcohol, and in several of the iodides and chlorides. *Dose.* One-sixteenth to ¼ gr., dissolved in alcohol, or made into a pill, in scrofula, syphilis, &c. It is also used externally.

III. (*Sesquiodide.*) The bright yellow powder that forms when a mixed solution of protonitrate and pernitrate of mercury (the latter in excess) is precipitated by another of iodide of potassium. The precipitate should be purified by digestion in a concentrated solution of common salt, and then washed and dried.

MERCURY, IODURETED BICHLORIDE OF. *Syn.* Hydrargyri Bichloridum ioduretum. *Prep.* (Lassaigne.) Add a solution of corrosive sublimate to an alcoholic solution of iodine till the color disappears, gently evaporate, and crystallize.

MERCURY, IODO-BICHLORIDE OF. *Syn.* Hydrargyri iodo-bichloridum. *Prep.* (Boullay.) Dissolve biniodide of mercury in a solution of corrosive sublimate, and crystallize. *** Both the above preparations possess considerable remedial powers in certain complaints, but their precise action and doses have not yet been determined.

MERCURY, NITRATES OF. *Prep.* I. (*Protonitrate of mercury.*) Digest mercury, in excess, in nitric acid diluted with 4 times its weight of water until the acid is saturated, evaporate and crystallize, leaving a globule of mercury in the liquid. By re-solution in water acidulated with nitric acid and spontaneous evaporation, the salt may be obtained perfectly pure.

II. (*Pernitrate of mercury.*) By dissolving mercury in nitric acid in excess, by a gentle heat, and allowing the solution to cool slowly, prismatic crystals of this salt are obtained.

III. (*Subnitrate of mercury. Dinitrate of do. Hydrargyri subnitras.*) Prepared by saturating nitric acid with mercury by heat, and then throwing the solution into water, and collecting and drying the precipitate. It is also formed when the crystallized pernitrate of mercury is put into hot water.

Remarks. This preparation is a yellow powder, but the shade varies according to the heat of the water employed to effect the precipitation. It is largely sold by a certain metropolitan wholesale drug house, at an exorbitant price, and is recommended for the extemporaneous preparation of the ointment of nitrate of mercury, according to the formula on the following label which accompanies each bottle:—"Hydrarg. subnitras. *Two scruples of the subnitrate of mercury mixed with one ounce of simple cerate, make the ung. hydrarg. nitrat. of the* London Pharmacopœia."

The difference, however, between such a preparation, and the ointment of the college, must be very evident, not only as to its appearance, smell, and general properties, but also as to its actual strength, arguing, merely, from the weight of the metal contained in each. In the one, the mercury is combined with a large excess of nitric acid,—in the other, the mercury exists in the state of a subsalt. In fact, this *newly-invented unguentum hydrargyri nitratis*, P. L. (?) possesses neither the quantity of mercury, nor of nitric acid, employed in the preparation of the latter, besides wanting many of its most sensible and valuable properties. (Cooley, Chem., iv. 374.)

MERCURY, OXIDES OF. *Prep.* I. (*Oxide of Mercury. Protoxide of do. Suboxide of do. Black oxide of do. Gray do. do. Ash do. do. Pulvis Hydrargyri Cinereus. Hydrargyri Oxydum Cinereum*, P. L. 1809 and 1824. *Hydrargyri Oxydum*, P. L. 1836. *Hydrargyri Oxydum Nigrum*, P. D. *Oxide gris de Mercure*, Fr. *Schwarzes gesauertes Quecksilber*, Ger.) 1. (P. L.) Calomel ℥j; lime water 1 gallon; mix, agitate well, decant the clear after subsidence, wash with distilled water, drain, and dry; wrapped in bibulous paper, in the air.

2. (P. D.) Sublimed calomel 1 part; water of caustic potash 4 parts; triturate together, wash and dry as above.

3. (Donovan and Liebig.) Briskly triturate calomel in a mortar with pure potassa in excess; wash with *cold* water, and dry in the shade.

Remarks. The above oxide is a very dark gray or black powder, rapidly suffering decomposition when exposed to light, becoming olive colored, from a portion being resolved into metallic mercury and binoxide. When it has a gray color (as that of the shops usually has) it contains undecomposed calomel. The beautiful *blue*-black or dark slate-blue powder prepared by decomposing calomel with liquor of ammonia, or a mixture of the liquors of ammonia and potassa, as recommended by Mr. Tyson in the Pharmaceutical Journal, is not pure protoxide of mercury, but a mixture of that oxide in variable proportions with proto-ammonio-chloride of mercury, and possesses much more power than the pure oxide. *Pure protoxide of mercury*, "digested for a short time in dilute muriatic acid, remains undissolved, and the filtered liquor is not affected by solution of potassa or by oxalate of ammonia. It is totally soluble in acetic acid, and entirely dissipated by heat." (P. L.) *As a medicine*, pure protoxide of mercury is *one* of the mildest of the mercurials, and is used both internally

and externally, but chiefly as a fumigant, or made into an ointment. *Dose.* ½ gr. to 3 grs. twice a day.

II. (*Binoxide of Mercury. Deutoxide of do. Peroxide of do. Red oxide of do.*) *Prep.* 1. BY PRECIPITATION. (*Hydrargyri Oxydum Rubrum*, P. L. 1824. *Hydrargyri Binoxydum*, P. L. 1836.) Bichloride of mercury ℥iv; water 6 pints; dissolve and precipitate with liquor of potassa f℥xxviij; decant, drain, wash in distilled water, and dry by a gentle heat. (P. L.)

Remarks. Binoxide of mercury prepared as above has a bright orange red color, and usually contains a little combined water; hence its readier solubility in acids than the oxide prepared by heat. "When heated sufficiently, it yields oxygen, and the mercury either runs into globules, or is totally dissipated. It is entirely soluble in muriatic acid." (P. L.) The preparation of the shops has frequently a brick-red color, arising from too little alkali being used. In *medicine*, binoxide of mercury is occasionally used as an escharotic, either in powder or made into an ointment. *Dose.* To induce salivation, ¼ gr. to 1 gr., combined with opium.

2. BY CALCINATION. (*Red precipitate per se. Calcined Mercury. Coagulated do. Oxide de Mercure rouge par le feu*, Fr. *Rothes Quecksilber oxyd*, Ger. *Mercurius præcipitatus per se. Mercurius calcinatus*, P. L. 1745. *Hydrargyrus calcinatus*, P. L. 1788. *Hydrargyri Oxydum Rubrum*, P. D. and P. L. 1809 and 1824.) Place mercury in a glass vessel having a narrow mouth and a broad bottom, and expose it to a heat of about 600° F., until it is converted into red scales.

Remarks. The above process is very tedious and unsatisfactory, as it requires considerable attention, and generally occupies *several weeks* to complete it. The product has the form of small brilliant scales of a ruby red color.

3. BY CALCINATION OF NITRATE OF MERCURY. (*Nitric oxide of Mercury. Red precipitate. Red precipitated Mercury. Mercurius præcipitatus ruber. Do. do. Corrosivus*, P. L. 1720. *Mercurius corrosivus ruber*, P. L. 1745. *Hydrargyrus Nitratus Ruber*, P. L. 1788. *Hydrargyri Nitrico-oxydum*, P. L. 1809, 1824, 1836. *Hydrargyrum oxydum Rubrum*, P. E. *Do. do. Nitricum*, P. D. *Oxyde Mercure rouge par l'Acide Nitrique*, Fr. *Rőther prăcipitatat*, Ger.) *Prep.* (P. L.) Mercury lb. iij; nitric acid lb. iss; distilled water 2 pints; mix, dissolve by heat, evaporate to dryness, powder, and calcine in a shallow vessel, with a gradually-increased heat, until red vapors cease to arise.

Remarks. The processes of the P. E. and D. are similar, except that the Dublin College directs the evaporation and calcination to be performed in the same vessel, without powdering or stirring the mass. The latter process is said by Mr Barker to yield the finest-colored product; but Mr. Brande states, that "the nitrate requires to be *constantly* stirred during the process, which is usually performed in a cast-iron pot." (Manual of Chem.) On the large scale the evaporation is generally conducted in a shallow earthen dish, and as soon as the mass becomes dry, a second dish is inverted over it, and the calcination continued without disturbance until the process is concluded. The heat of a sand-bath is employed. 100 lbs. of mercury and 48 lbs. of nitric acid, sp. gr. 1·48, yield 112 lbs. of red precipitate. (Brande.)

Prop., Uses, &c. Red precipitate forms bright red crystalline scales, and usually contains a little undecomposed pernitrate of mercury; in other respects it resembles the last two preparations. It is more generally used as an escharotic, and in ointments, than the precipitated oxide. "Entirely soluble in muriatic acid." (P. E.) It is volatilized by heat without the evolution of nitrous vapors. "Neither lime water nor sulphureted hydrogen produce any change in water in which it has been boiled." (P. L.) According to Mr. Brande, it must contain about 2½ per cent. of nitric acid.

MERCURY, PHOSPHATE OF. *Syn.* HYDRARGYRI PHOSPHAS. *Prep.* (Prus. Ph.) Precipitate a solution of nitrate of mercury with another of phosphate of soda, acidulated with nitric acid; wash and dry the precipitate.

MERCURY, SULPHATES OF. I. (*Subsulphate of Mercury. Yellow do. do. Turpeth's mineral. Turbith's do. Queen's yellow. Turpethum minerale. Hydrargyri subsulphas. Do. do. flavus. Hydrargyri oxydum sulphuricum*, P. D. *Mercurius emeticus flavus. Hydrargyrus vitriolatus. Subsulphate de mercure*, Fr. *Gelbes Schwefelsäures Quecksilberoxyd*, Ger.) *Prep.* 1. (P. D.) Persulphate of mercury 1 part; warm water 20 parts; triturate together in an earthen mortar, wash well with distilled water, drain and dry.

2. Dissolve mercury in an equal weight of oil of vitriol by boiling to dryness, fling the mass into hot water, and wash and dry the resulting yellow powder.

Remarks. The heat of the water used to decompose the persulphate, influences the shade of color. It has usually a lemon yellow color, and is used both as a pigment and in medicine. *Dose.* As an alterative ½ gr. to 1 gr.; as an emetic 3 to 5 grs.; as an errhine 1 grain, mixed with a pinch of liquorice powder or mild snuff, and sniffed up the nose. It is a *powerful poison.*

II. (*Persulphate of Mercury. Bipersulphate of do. Hydrargyri Persulphas*, P. D. *Do. Bisulphas.*) *Prep.* (P. D.) Dissolve mercury 6 parts in a mixture of sulphuric acid 6 parts and nitric acid 1 part, by boiling in a glass vessel, and continue the heat until the mass becomes perfectly dry and white. *Used* to make calomel.

Remarks. When 2 parts of mercury are gently heated in 3 parts of sulphuric acid, *protosulphate* of mercury is formed; but if the solution be effected by a strong heat, and the liquid be evaporated to dryness, a *bisulphate of the peroxide* (bipersulphate) results. When this sulphate is thrown into hot water, decomposition ensues, and the yellow *subsulphate* of mercury is precipitated, and a portion of the bisulphate, together with some free sulphuric acid, remains in solution. (Liebig.) Either of the above sulphates should be entirely volatilized by heat.

MERCURY, SULPHURETS OF. I. (PROTOSULPHURET.) *Prep.* Transmit sulphureted hydrogen through a dilute solution of nitrate of mercury, or through water in which calomel is suspended. A black powder. This is the pure *black sulphuret* or *protosulphuret.*

II. (*Bisulphuret of mercury Red sulphuret of do. Factitious cinnabar. Vermilion. Cinnabaris factitia*, P. L. 1745. *Hydrargyrus sulphuratus ruber*, P. L. 1788. *Hydrargyri bisulphuretum rubrum*, P. L. 1809 & 1824. *Hydrargyri sulphuretum*, P. L. 1836. κιννάβαρι, Gr. *Deutosulphure de mercure; sulphure de mercure rouge*, Fr. *Zinnober*, Ger.) *Prep.* (P. L.) Mercury lb. ij; sulphur ℥v; melt together, and continue the heat till the mixture swells up, then cover the vessel, remove it from the heat, and when cold, powder and sublime. The formulæ of the other colleges are similar.

Remarks. Bisulphuret of mercury has a dark-red semi-crystalline appearance in the mass, but acquires a brilliant scarlet color by powdering. It is tasteless, odorless, and insoluble. It is chiefly used as a pigment; but it is occasionally used in medicine as a diaphoretic and vermifuge, and in some cutaneous diseases, and gout. *Dose.* 10 to 30 grs.; as a fumigative ℈j or ℈ij thrown on a red-hot iron. When pure, "it is totally dissipated by heat; and on potash being added to it, runs into globules of mercury. It is insoluble in nitric or muriatic acid, but dissolves in a mixture of them. Spirit, water, or acetic acid digested on it, acquires no color, nor is either of these menstrua afterwards affected by iodide of potassium." (P. L.) See VERMILION.

MERCURY, BLACK SULPHURET. *Syn.* BISULPHURET OF MERCURY WITH SULPHUR. ETHIOPS MINERAL. ÆTHIOPS MINERALIS, (P. L. 1745.) HYDRARGYRUS CUM SULPHURE, (P. L. 1788.) HYDRARGYRUM SULPHURETUM NIGRUM, (P. L. 1824 & P. D.) HYDRARGYRI SULPHURETUM CUM SULPHURE, (P. L. 1836.) SULPHURE DE MERCURE NOIR, (*Fr.*) SCHWARZES SCHWEFELQUECKSILBER, (*Ger.*) This is properly a mixture of bisulphuret of mercury and sulphur, in variable quantities. The London and Dublin Colleges order it to be prepared by triturating together in a mortar equal parts of mercury and sulphur until globules are no longer visible. On the large scale, it is generally made by melting the ingredients together, and afterwards reducing the mass to fine powder in a mill or mortar.

Pur., Uses, &c. Ethiops mineral is a heavy black powder. It is frequently imperfectly prepared, and sometimes adulterated. If it contain *free mercury*, it will stain a piece of bright copper or gold *white* when rubbed on it; if it contain *charcoal, blacklead*, or *bone black*, these will remain behind when it is heated. Its sp. gr. will indicate whether it contains the proper quantity of mercury. When pure it is totally dissipated by heat, (without incandescence,) no charcoal or phosphate of lime being left. (P. L.) It has been said to be vermifuge and alterative, and has been used in some cutaneous and glandular diseases, but appears to be inert. *Dose* 5 to 30 grs.

MESITULE. This name has been applied by Kane to the theoretical organic radical of which acetone is presumed to be the hydrated oxide. *Chloride of mesitule* is made by acting on acetone with perchloride of phosphorus; and this compound, by the action of pure potassa water, yields chloride of potassium and *oxide of mesitule. Mesitylene* is obtained with other products when acetone is distilled with fuming sulphuric acid. (Kane.)

MESOXALIC ACID. A new acid formed with other products when a saturated solution of alloxanate of baryta or strontia is heated to the boiling point. It possesses but little practical importance.

METACETONE. A colorless, ethereal liquid obtained by distilling a mixture of 1 part of sugar and 8 parts of finely-powdered quicklime at a heat of about 285°, and adding water to the product.

METALDEHYDE. The volatile prismatic crystals that form in aldehyde when kept at ordinary temperatures. It is soluble in alcohol.

METALLOIDS. (From μεταλλον, *a metal*, and ειδος, *form*.) In CHEMISTRY, non-metallic inflammable bodies, as sulphur, phosphorus, &c. The metallic bases of the alkalis and earths have also been called metalloids, but are more properly termed metals.

METALS. *Syn.* METAUX, (*Fr.*) METALLE, (*Ger.*) From *metallum*, or μεταλλον, *a metal*. In CHEMISTRY, metals are electro-positive bodies, which are distinguished by their weight, lustre, fusibility, and power of conducting electricity. All the metals are chemical elements. Their individual or distinctive characters will be found described in their alphabetical places.

METAMARGARIC ACID. A new acid formed along with *metoleic acid* by the action of sulphuric acid on twice its weight of olive oil.

METAPHOSPHORIC ACID. Prepared by burning phosphorus in dry air or oxygen gas, or heating to redness a concentrated solution of phosphoric, or pyrophosphoric acid. The latter mode of preparation yields a hydrated acid. It produces precipitates in solutions of most of the bases, which are *metaphosphates*. The metaphosphate of soda is formed when pyrophosphate of soda is heated to low redness. It is deliquescent.

METHEGLIN. (From *meth*, *Ger.*, *mead*.) *Syn.* HYDROMEL VINOSUM. *Prep.* Honey 1 cwt.; water 24 gallons; mix in a cask, and stir daily until dissolved, then add yeast 1 pint, and hops 1 lb., previously boiled in water 1 gallon, along with water sufficient to make the whole 1 barrel; mix well, and ferment. Contains on the average about 7 to 8$\frac{0}{0}$ of alcohol. Mead and metheglin are frequently confounded together.

METHIONIC ACID. A sour liquid, obtained from methionate of baryta, in the same way as isethionic acid is from isethionate of baryta.

METHIONATE OF BARYTA. *Prep.* Saturate ether with anhydrous sulphuric acid, at the ordinary temperature of the atmosphere, dilute with water, neutralize with carbonate of baryta, and when nearly about to crystallize add an equal bulk of alcohol; methionate of baryta will be precipitated, and may be purified by re-solution and crystallization. Resembles chlorate of potash, and is soluble in water.

METHULE. The hypothetical radical of pyroxilic spirit. Iodide, chloride, bromide, fluoride, and sulphuret of methule have been formed. (See PYROXILIC SPIRIT.)

METHULE, OXIDE OF. *Syn.* HYDRATE OF METHYLINE. METHYLIC ETHER. *Prep.* Distil a mixture of equal volumes of pyroxilic spirit and oil of vitriol, and pass the evolved vapors first through milk of lime, and then through a series of Woolf's bottles, containing water. The water

must then be gently heated, and the gas collected over mercury. It may be dried and deprived of undecomposed pyroxilic spirit by pure potassa. Water absorbs 37 times its volume of this gas. When this gas is brought into contact with the vapor of anhydrous sulphuric acid, it unites with the latter, forming *sulphate of methule.*

METHYLAL. A peculiar ethereal liquid obtained along with other products by distilling a mixture of pyroxilic spirit, water, oil of vitriol, and manganese.

METHYLENE. A peculiar liquid hydrocarbon, obtained from pyroxilic spirit.

MICROCOSMIC SALT. *Prep.* Mix equal parts of phosphate of soda, and phosphate of ammonia in solution, evaporate and crystallize. A slight excess of phosphate of ammonia aids the crystallization. Used in blowpipe assays.

MICROSCOPE. The use of a brilliant *portfire* has been lately adopted with considerable success as a substitute for the lime-light of the oxyhydrogen microscope. A clear and powerful light may be thus produced at very little expense and trouble. A single microscope may be very easily obtained by piercing a small round hole in a slip of metal, and introducing into it a drop of water, which will immediately assume a globular form on each side of the metal, and possess considerable magnifying power. The crystalline lens of the eye of a minnow may also be used.

MILK. *Syn.* Lac, (*Lat.*) Lait, (*Fr.*) Milch, (*Ger.*) The value of milk as an article of food is sufficiently evident from its being *alone* sufficient to support and increase the growth of the young of every species of mammalia; at once supplying materials for the formation of the osseous, fleshy, and liquid portions of the body. Cow's milk, of average quality, contains from 10 to 12% of solid matter when evaporated to dryness by steam heat, and has the mean sp. gr. 1·030; while that of the skimmed milk is about 1·035; and of the cream 1·0244. (Ure.) The average cream of cow's milk contains 4·5% of butter, 3·5% of curd, and 92% of whey. (Berzelius.) The skimmed milk consists of water 92·9%, curd 2·8%, sugar of milk 3·5%, lactic acid, lactate of potash, and a trace of lactate of iron 0·6%, muriate and phosphate of potash and earthy phosphates (lime) 0·2%. (Berzelius.)

Milk may be preserved in stout well-corked and wired bottles by heating them to the boiling point in a water-bath, by which the small quantity of inclosed air becomes decomposed. Milk, or green gooseberries, or peas, thus treated, will keep for 2 years. Some persons add a few grains of calcined magnesia to each bottle of milk before corking it. (See Cows, Cream, Dairy, Cheese, &c.)

*** Milk should not be kept in lead or zinc vessels, as it speedily dissolves a portion of those metals.

MILK, ELEPHANT'S. *Syn.* Urine d'Elephant. *Prep.* Gum benzoin 2 oz.; rectified spirits of wine 1 pint; dissolve; add boiling water 2½ pints, agitate for 5 minutes in a strong corked bottle, and when cold, strain, and add lump sugar ½ lb.

MILK OF ROSES. *Syn.* Lac Rosæ. *Prep.* I. (*English.*) *a.* Liquor of potassa, oil of almonds, and hot water, of each 1 oz.; agitate till perfectly mixed; then add rose water 3 oz.; and again agitate well.—*b.* To the last add orange-flower water ½ oz.—*c.* To either the first or second add essence of bergamot 1 dr.—*d.* Blanched Jordan almonds 4 oz.; oil of almonds, Castile soap, and white wax, of each ¼ oz.; spermaceti 1 dr.; make an emulsion with rose water 1½ lb.; strain, and add oil of lavender 15 drops, dissolved in rectified spirit 8 oz.: mix. This keeps well.—*e.* Either of the last may be diversified by adding a little tincture of benzoin, or bitter almonds, or by substituting elder-flower water for rose water.

II. (*French.*) Rose water 1 quart; tinctures of benzoin and storax, of each 1 oz.; spirit of roses ½ oz.; rectified spirit 2 oz.; mix.

III. (*German.*) Solution of diacetate of lead (P. L.) and spirits of lavender, of each 1 oz.; rose water 6 oz.; soft water 1 pint; mix.

Remarks. All the above are used as cosmetic washes.

MINCE MEAT. (In Cookery.) *Prep.* Stoned raisins, currants, sugar, and suet, of each 2 lbs.; sultana raisins, boiled beef, (lean and tender,) of each 1 lb.; apples 4 lbs.; juice of 2 lemons; the rind of one lemon chopped very fine; mixed spice ¼ lb.; candied citron and lemon peel, of each 2 oz.; brandy a glass or two; chop the whole very fine. It may be varied by adding other spice or flavoring, and the addition of eggs, or the substitution of chopped fowl or veal for beef, according to fancy.

MINERAL MARMORATUM. I. Anhydrous phosphoric acid 48 grs.; pure caustic lime 52 grs.; both finely pulverized; mix rapidly in a mortar.

*** This powder soon becomes moist; it must therefore be brought as quickly as possible into the cavity of the tooth, which has been cleaned and dried; the powder is to be well pressed into the cavity, smoothed off, and moistened on its surface. It is white and durable, and soon acquires great hardness. In its composition it resembles the natural earthy matter of the teeth. (Lancet.)

II. Mix a little finely-powdered glass with some *mineral succedaneum.* (No. II.) Inferior to the last, and dark colored.

MINERAL METALLIC CEMENT. *Prep.* Add finely-levigated steel filings to some *mineral succedaneum.* (No. II.) Used to fill hollow teeth. Dark colored; inferior to the *mineral marmoratum.*

MINERAL SUCCEDANEUM. *Prep.* I. Heat gold in a bright iron ladle, and add enough pure mercury to render it of a doughy consistence at the heat of hot water. For use, a little must be kneaded as hot as possible in the hand and wedged into the cavities of the teeth. Keeps its color well.

II. A mixture of tinfoil and quicksilver. As last. Turns dark. All the above are used by dentists.

MINIUM. *Syn.* Red Lead. Red Oxide of Lead. Minium, (*Fr.*) Mennage, (*Ger.*) Plumbi oxydum Rubrum, (*Lat.*) *Prep.* The best red lead is prepared by exposing ground and elutriated massacot, or dross of lead, in shallow iron trays, (about 12 inches square, and about 4 or 5 inches deep,) piled up on the hearth of a reverberatory furnace, to a heat of about 600 to 650°, and occasionally stirring about till it acquires the proper color. The furnace employed for the preparation of massicot during the day, usually possesses sufficient residuary heat during the night for this process, by which

fuel is saved. Lead for the above purpose should be as pure as possible. *Used* as a pigment, and to make plasters.

MITHRIDATIUM. *Syn.* CONFECTIO DAMOCRATIS, (P. L. 1746.) This consisted of no fewer than *forty-five* ingredients, and contained 1 gr. of opium in each ℥ss.

MIXTURE. *Syn.* MISTURA, (*Lat.*) (In PHARMACY.) A compound liquid medicine, taken in divided doses. Mixtures are usually extemporaneous preparations, and in prescribing them, care should be taken not to bring together substances that decompose each other, nor to order heavy powders that speedily separate by subsidence. Emulsions, juleps, and mucilages, are included under this head in the last edition of the London Pharmacopœia. Mixtures are usually dispensed in flat octagonal 6 or 8 oz. bottles, with long necks, or in regular octagons, with short necks, having the doses marked on the glass, to which the strength of the medicine is made to correspond. (See DRAUGHTS, EMULSIONS, JULEPS.)

MIXTURE, ALKALINE. *Syn.* MISTURA ALKALINA. *Prep.* Liquor of potassa ʒiss; tincture of opium ʒj; spirit of nutmeg ʒij; water ℥vss; mix. Anodyne and antacid. *Dose.* 1 to 2 tablespoonfuls 2 or 3 times a day in flatulence, dyspepsia, heartburn, &c.

MIXTURE, ALMOND. *Syn.* MILK OF ALMONDS; EMULSION OF DO. M. AMYGDALÆ, (P. L.) M. AMYGDALARUM, (P. E. and D.) LAC AMYGDALÆ. *Prep.* I. (P. L.) Confection of almonds ℥iiss; distilled water 1 pint; gradually mix, triturating all the time in a mortar, then strain through linen.

II. (P. E.) Sweet almonds ℥ij ʒij; blanch, add white sugar ℥v; beat to a smooth paste, further add mucilage f ℥ss, (or powdered gum ʒiij;) mix well, then triturate with water 1 quart, gradually added, and strain.

III. (P. D.) Blanched sweet almonds ʒiss; do. bitter almonds ℈ij; sugar ℥ss; water ℥xxxij.

IV. (Pereira.) Blanched sweet almonds ʒiv; powdered gum ʒj; white sugar ʒij; water f ℥viss.

Remarks The last formula produces the article usually employed in dispensing in the shops. The addition of a little more sugar renders it pleasanter; and a small quantity of bitter almonds, as in the Dublin form, or a drachm or two of rose or orange-flower water, may occasionally be added to diversify the flavor. *Dose.* 2 or 3 tablespoonfuls ad libitum, as a demulcent and emollient in coughs and colds, or as a vehicle for more active medicines.

MIXTURE, AMMONIA. *Syn.* M. AMMONIÆ CARBONATIS. *Prep.* (St. B. H.) Carbonate of ammonia ℈ij; pimento water f ℥iv; pure water f ℥vj; mix. *Dose.* 1 or 2 tablespoonfuls 3 or 4 times a day, in heartburn, dyspepsia, headache, &c., accompanied by lowness of spirits.

MIXTURE, ACETATE OF AMMONIA. *Syn.* M. AMMONIÆ ACETATIS. *Prep.* A solution of acetate of ammonia ℥iss; nitre ℈ij; camphor mixture ℥vj; rose sirup ℥ss; mix. *Dose.* 1 to 3 tablespoonfuls every third or fourth hour, as a diaphoretic in inflammatory fevers, &c.

MIXTURE, AMMONIACUM. *Syn.* MILK OF AMMONIACUM. EMULSION OF DO. LAC AMMONIACI. M. AMMONIACI, (P. L. and D.) *Prep.* (P. L.) Ammoniacum ʒv; water 1 pint; gradually mix, by trituration, and strain through linen. *Dose* f ℥ss to f ℥j, either alone or combined with squills or ipecacuanha, as an expectorant and demulcent in chronic coughs, humoral asthma, &c.

MIXTURE, ANODYNE. *Syn.* M. ANODYNA. JULEP CALMANS. *Prep.* I. (P. Cod.) Sirup of opium ʒij; sirup of orange flowers ʒvj; lettuce water ℥iv; mix. To allay pain, induce sleep, &c.

II. Prepared chalk ʒij; sirup of poppies ℥j; fetid spirit of ammonia ʒiss; oils of dill and aniseed, of each 3 drops; water ℥ivss; mix. *Dose.* A teaspoonful 3 or 4 times a day, in the diarrhœa of infants accompanied with pain.

MIXTURE, ANTACID. *Syn.* M. ANTACIDA. *Prep.* I. (Ryan.) Solution of potassa f ʒj; lime water f ℥viij; calcined magnesia ʒj; oil of peppermint 5 drops; tinct. of opium f ʒj; mix. *Dose.* 1 to 2 tablespoonfuls 3 or 4 times daily in dyspepsia, heartburn, acidity, &c.

II. (Collier.)—*a.* Prepared chalk ʒij; compound tincture of cardamoms ℥iss; tincture of ginger f ʒij; pimento water ℥vj; mix. Stimulant, antacid. *Dose.* 2 tablespoonfuls every second or third hour, in diarrhœa accompanied with acidity, after surfeits, &c.—*b.* Chalk mixture f ℥v; tinctures of catechu and cinnamon, of each ℥ss; mix. *Dose.* 1 or 2 tablespoonfuls after every liquid dejection in diarrhœa.

MIXTURE, ANTICROUPAL. *Syn.* M. SENEGÆ. *Prep.* (Jadelot.) Infusion of senega ℥iv; sirup of ipecacuanha ʒj; oxymel of squills ʒij; tartarized antimony $1\frac{1}{2}$ grs.; mix. *Dose.* By spoonfuls in croup.

MIXTURE, ANTI-EPILEPTIC. *Syn.* M. ANTI-EPILEPTICA. *Prep.* (M. Lemoine.) Liquor of ammonia 12 drops; sirup of orange flowers ℥j; distilled water of Linden flowers ℥ij; do. of cherry laurel ℥ss; mix. According to M. Lemoine, this is a specific in epilepsy.

MIXTURE, ANTIHYSTERIC. *Syn.* M. ANTIHYSTERICA. *Prep.* I. (P. Cod.) Sirup of wormwood ℥j; tincture of castor ʒss; valerian water and orange-flower water, of each ℥ij; ether ʒj; mix.

II. Asafœtida ʒj; peppermint water ℥vj; triturate together, then add ammoniated tincture of valerian ʒij; tincture of castor ʒiij; sulphuric ether ʒiss; mix. *Dose.* ℥ss, 3 or 4 times daily.

MIXTURE, ANTISCROFULOUS. *Syn.* M. ANTISCROFULOSA. *Prep.* Tincture of bichloride of gold 30 drops; tincture of iodine 40 drops; tincture of gentian ʒj; simple sirup ʒvij; rose water ℥v; mix. *Dose.* A dessert-spoonful 2 or 3 times daily, observing to shake the bottle before pouring out the liquid. *⁎* The writer of this article has seen repeated instances of the excellent effects of this medicine in scrofula, syphilis, and various glandular diseases.

MIXTURE, ANTISPASMODIC. *Syn.* M. ANTISPASMODICA. *Prep.* I. (Collier.) *a.* Asafœtida and camphor mixtures, of each f ℥iiss; tincture of valerian f ℥j; mix. *Dose.* 1 tablespoonful every third or fourth hour. *b.* Fetid spirit of ammonia, sirup of saffron, and tincture of valerian, of each f ʒiij; camphor mixture f ℥viss; mix. *Dose.* 2 or 3 tablespoonfuls as above.

II. Tincture of castor ʒj; sulphuric ether and laudanum, of each 10 drops; cinnamon water f ℥iss; mix for a dose, to be taken thrice a day.

III. Volatile tincture of valerian, and tincture of castor, of each ʒv; tincture of henbane ʒij; peppermint water and camphor mixture, of each ℥iss; mix. *Dose* 1 tablespoonful 3 or 4 times a day.

MIXTURE, APERIENT. *Syn.* M. Aperiens. *Prep.* I. (Abernethy.) Epsom salts ʒiv; manna ʒij; infusion of senna fʒvj; tincture of senna fʒij; spearmint water f℥j; pure water f℥ij; mix. *Dose.* A wine-glassful or more. (See Black Draught.)

II. (Collier.) Sulphate of iron ℈j; Epsom salts ℥j; pennyroyal water 1 pint; dissolve. *Dose.* A wine-glassful twice a day in atonic amenorrhœa.

MIXTURE, AROMATIC. *Syn.* M. Aromatica. Potion aromatique, (*Fr.*) *Prep.* I. (P. Cod.) Sirup of clove-gillyflower ℥j; spirits of cinnamon ʒiv; confection of hyacinth ʒij; peppermint and orange-flower water, of each ℥ij; mix.

II. (St. B. H.) Aromatic confection ʒiiss; pure water f℥v; pimento water f℥iij; mix. An excellent aromatic in diarrhœa, heartburn, flatulence, acidity, &c. *Dose.* A tablespoonful or two every 2 or 3 hours.

MIXTURE, ARSENICAL. *Syn.* M. arsenicalis. *Prep.* Liquor of arsenite of potassa, P. L. ʒiij; compound tincture of cardamoms ʒv; cinnamon water ℥iij; pure water ℥iv; mix. *Dose.* ℥ss twice a day after a full meal, in agues, periodic headaches, lepra, psoriasis, chronic rheumatism, &c. *⁎* It should be exhibited with caution, and its effects watched.

MIXTURE, ASAFŒTIDA. *Syn.* Milk of Asafœtida. M. Asafœtidæ, (P. L. & D.) Lac do. *Prep.* (P. L.) Asafœtida ʒv; water 1 pint; mix gradually, triturating all the while. The Dublin College orders only half the above quantity of asafœtida, and *pennyroyal* instead of *pure* water. Stimulant and antispasmodic. *Dose.* ½ to 1½ oz., chiefly in hysteria. It is also used as an enema in flatulent colic, worms, hooping-cough, and convulsions of children.

MIXTURE, ASTRINGENT. *Syn.* M. astringens. *Prep.* I. (Thomson.) Extract of catechu ʒij, (or tincture ℥j;) cinnamon water ℥viij; dissolve. *Dose.* 1 to 3 tablespoonfuls after every liquid dejection, in diarrhœa or dysentery.

II. (Pradel.) Tannin 12 grs.; tincture of rhatany ʒj; simple sirup ʒvij; mucilage ℥j; camphor mixture ℥iv; mix. As last.

MIXTURE, ATROPHIC. *Syn.* M. atrophica. *Prep.* (Majendie.) Iodide of potassium ʒiv; lettuce water ℥viij; peppermint water ʒij; sirup of marshmallow ℥j; mix.

MIXTURE, BALSAM OF PERU. *Syn.* M. Balsami Peruviani. *Prep.* Strained honey and balsam of Peru, of each ʒij; mix by trituration, and add gradually decoction of liquorice ℥vj, aromatic sulphuric acid 20 drops, tincture of orange-peel ℥ss; mix well. *Dose.* 1 to 2 tablespoonfuls 2 or 3 times a day in debility.

MIXTURE, BARLEY. *Syn.* M. Hordei, (P. E.) The same as the compound decoction of barley, P. L. (See Decoctions.)

MIXTURE, BRANDY. *Syn.* M. Spiritus Vini Gallici, (P. L.) Egg Flip, (vulgo.) *Prep.* Brandy and cinnamon water, of each f℥iv; yelks of 2 eggs; white sugar ℥ss; oil of cinnamon 2 drops; mix. A valuable stimulant and restorative in low fevers, and extreme exhaustion from hemorrhages, &c. *Dose.* 1 to 3 tablespoonfuls occasionally. "Did the College practically test the quality of their '*egg-hot*' before deciding on the formula?"

MIXTURE, BRUCINE. *Syn.* M. Bruciæ. Potio stimulante. *Prep.* (Majendie.) Pure brucia 5 grs.; white sugar ʒij; water f℥ij; mix carefully. *Dose.* ½ to a whole tablespoonful night and morning.

MIXTURE, CAMPHOR. *Syn.* Camphor Julep. Do. Water. M. Camphoræ, (P. L. E. & D.) *Prep.* (P. L.) Camphor ʒss; rectified spirit 10 drops; triturate together, then gradually add water 1 pint; triturate and strain. The Edinburgh College orders camphor ℈j; sugar and sweet almonds, of each ℥ss; water 1 pint. *Dose.* 2 to 4 tablespoonfuls. It is chiefly used as a vehicle for other medicines.

MIXTURE, CAMPHOR AND MAGNESIA. *Syn.* M. Camphoræ cum Magnesia. *Prep.* (P. E.) Camphor 10 grs., (12 grs. P. D.;) carbonate of magnesia 25 grs., (ʒss P. D.;) triturate together, then add gradually water f℥vj, still continuing the trituration. Antacid, antispasmodic, and anodyne. *Dose.* 1 to 2 tablespoonfuls. Used without straining.

MIXTURE, CAPSICUM. *Syn.* M. Capsici. *Prep.* (Collier.) Tincture of capsicum fʒij; infusion of roses f℥vj; mix. Stimulant in dyspepsia, &c. *Dose.* 1 to 2 tablespoonfuls half an hour before dinner.

MIXTURE, CARMINATIVE. *Syn.* M. Carminativa. *Prep.* (Dr. Paris.) Calcined magnesia ʒss; peppermint water fʒiiss; compound tincture of lavender fʒss; spirit of caraway fʒiv; sirup of ginger fʒij; mix for 1 or 2 doses. Antacid and carminative.

MIXTURE, CASCARILLA. *Syn.* M. Cascarillæ composita, (P. L.) *Prep.* Infusion of cascarilla f℥xvij; vinegar of squills f℥j; compound tincture of camphor f℥ij; mix. *Dose.* f℥j to f℥iss 2 or 3 times a day in chronic cough and asthma, and in the catarrh of elderly people.

MIXTURE, CASTOR OIL. *Syn.* M. Ricini. Emulsio purgans. *Prep.* (P. Cod.) Castor oil ℥j; yelk of 1 egg; peppermint water ℥ss; sirup ℥j; pure water ℥ij; make an emulsion. One of the best ways of exhibiting castor oil to persons who dislike it.

MIXTURE, CATHARTIC. *Syn.* M. Cathartica. *Prep.* (A. T. Thomson.) Sulphate of potash ʒij; water f℥vss; tincture of jalap fʒiv; mix. *Dose.* 2 tablespoonfuls every 2 hours.

MIXTURE, CHALK. *Syn.* Cretaceous Mixture. M. Cretæ, (P. L. E. & D.) *Prep.* (P. L.) Prepared chalk ℥ss; sugar ʒiij; gum mixture (mucilage) f℥iss; triturate, then add cinnamon water f℥xviij; mix. The Ed. Ph. orders spirit of cinnamon f℥j to the above quantity. Antacid, absorbent. *Dose.* 1 to 3 tablespoonfuls, either alone or combined with aromatic confection, in heartburn, and in diarrhœa after every liquid motion.

MIXTURE, CINCHONA. *Syn.* Bark Mixture. M. Cinchonæ. *Prep.* I. (Copland.) Confection of red roses ℥ss; boiling decoction of bark f℥viij; triturate, in 10 minutes strain, and add di-

luted sulphuric acid ʒiss; spirit of nutmeg ʒiv; shake well. Febrifuge, tonic, and stomachic. *Dose.* 1 to 3 tablespoonfuls, 2 or 3 times a day.

II. To the last add Epsom salts ℥ss; *Dose* and *uses* as last. Slightly aperient.

MIXTURE, COPAIBA. *Syn.* M. COPAIBÆ. *Prep.* I. (Guy's H.) Balsam of copaiba ʒiij; liquor of potassa ʒiss; triturate together, and gradually add barley-water, ℥viij. One of the best ways of exhibiting this drug.

II. (St. B. H.) Balsam of copaiba fʒiij; mucilage f℥iij; triturate together, and make an emulsion with pimento water f℥ij; pure water f℥iv. *Dose.* Of either of the above, 1 to 3 tablespoonfuls 3 or 4 times a day, in diseases of the urinary organs, &c.

MIXTURE, COPAIBA AND OLIBANUM. *Syn.* M. COPAIBÆ CUM OLIBANO. *Prep.* (P. C.) Balsam of copaiba ℥ss; olibanum ʒij; mucilage ℥iss; honey ℥j; cinnamon water ℥v. As last.

MIXTURE, COPAIBA, (VINOUS.) *Syn.* M. COPAIBÆ VINOSA. *Prep.* (Fuller.) Copaiba ℥ij; yelks of 2 eggs; triturate together, add sirup of tolu ℥ij; again mix well, then further add white wine f℥iv. *Dose.* A dessert-spoonful 3 or 4 times a day.

MIXTURE, COSMETIC. *Syn.* M. COSMETICA. *Prep.* Oil of almonds, and oil of tartar, of each ℥ij, (or liquor of potassa ℥iij;) rose water ℥v; mix well. Used to clear the complexion.

MIXTURE, CREOSOTE. *Syn.* M. CREASOTI. M. CREAZOTI, (P. E.) *Prep.* Creosote and acetic acid, of each 16 drops; mix, then add compound spirit of juniper and sirup, of each f℥j; water f℥xiv; agitate well together. *Dose.* f℥j to f℥ij in vomiting, especially to relieve or prevent sea-sickness.

MIXTURE, CREOSOTE, (ALKALINE.) *Syn.* M. CREASOTI ALKALINA. *Prep.* (Allnatt.) Creosote and solution of potassa, of each ʒj; white sugar ʒij; triturate together, then add camphor mixture f℥vj; mix well.

MIXTURE, CUBEBS. *Syn.* M. CUBEBÆ. *Prep.* (Fr. H.) Powdered cubebs ℥j, (or essence ℥ss;) sirup and mucilage, of each ℥iss; triturate, then add cinnamon water f℥vj. *Dose.* 2 tablespoonfuls in certain diseases of the urinary organs.

MIXTURE, CYANIDE OF POTASSIUM. *Syn.* M. POTASSII IODIDI. *Prep.* Cyanide of potassium 1 gr.; sirup ℥j; water ℥v; mix. *Dose.* 1 dessert-spoonful.

MIXTURE, DEMULCENT. *Syn.* M. DEMULCENS. *Prep.* I. (Collier.) Mucilage ℥j; oil of almonds and sirup of tolu, of each ℥ss; triturate, and add water f℥vj; mix well.

II. (Thomson.) Decoction of marshmallow f℥vj; sirup f℥j; mix.

III. Spermaceti ʒij; yelk of 1 egg; triturate, add sirup ℥j; mucilage ℥ss; cinnamon water ℥ij; pure water ℥iv; mix well. *Dose.* Of each of the above 1 to 2 tablespoonfuls ad libitum; in coughs, hoarseness, calculus, irritation of the urinary organs, &c.

MIXTURE, DIAPHORETIC. *Syn.* M. DIAPHORETICA. *Prep.* Solution of acetate of ammonia ℥iij; antimonial wine ʒij; laudanum ʒj; camphor mixture ℥iij; mix. *Dose.* 1 to 2 tablespoonfuls, in fevers, &c.

II. To the last add sweet spirits of nitre ℥ss.

MIXTURE, DIARRHŒA. *Syn.* M. PRO DIARRHŒA. *Prep.* Aromatic confection ℥ss; tincture of opium ʒiss; tincture of cardamoms (comp.) ʒiiss; peppermint or cinnamon water ℥v; mix. *Dose.* 1 tablespoonful after every liquid stool.

MIXTURE, DIURETIC. *Syn.* M. DIURETICA. *Prep.* I. (Guy's H.) Nitre ʒiij; peppermint water ℥xss; sweet spirits of nitre fʒiij; lemon sirup ℥j; mix.

II. Infusion of digitalis ℥vss; tincture of digitalis ʒss; acetate of potassa ʒij; spirit of juniper ℥ss; laudanum ℈j; mix. *Dose.* 1 to 2 tablespoonfuls; in dropsy.

MIXTURE, ELATERIUM. *Syn.* M. ELATERII. *Prep.* (Collier.) Elaterium 1 gr.; soft extract of liquorice ʒj; triturate, and add gradually water (warm) f℥vj. *Dose.* 1 to 2 tablespoonfuls every 2 hours; in dropsy, &c.

MIXTURE, EMETIC. *Syn.* M. EMETICA. *Prep.* I.—*a.* (Thomson.) Tartarized antimony 8 grs., sirup of mulberries ʒj; water f℥vj; mix, and dissolve.—*b.* Ipecacuanha ʒss; tartarized antimony 1 gr.; tincture of squills fʒj; water f℥vj; mix. *Dose.* 1 to 2 tablespoonfuls, repeated every ¼ of an hour till vomiting be induced; in dropsy, before exhibiting fox-glove.

II. (Copland.) Sulphate of zinc ℈ij; ipecacuanha wine and tincture of serpentary, of each fʒiv; tincture of capsicum 40 drops; oil of chamomile 12 drops; peppermint water f℥ivss; mix. An excitant emetic.

MIXTURE, EMETINE. *Syn.* M. EMETINÆ. MELANGE VOMITIF. *Prep.* (Majendie.) Pure emetine 1 gr., (or colored 4 grs.;) acetic acid 8 drops; sirup of marshmallow and orange-flower water, of each f℥j; pure water f℥iss; mix. Emetic. *Dose.* A dessert-spoonful, repeated at short intervals, till it operates.

MIXTURE, EMMENAGOGUE. *Syn.* M. EMMENAGOGA. *Prep.* I. Compound steel mixture ℥iij; cinnamon water ℥vj; mix. *Dose.* 2 tablespoonfuls 2 or 3 times a day.

II. Tinctures of sesquichloride of iron and aloes, (comp.,) of each ℥ss; tincture of castor ʒij; spirit of pimento ʒij; chamomile infusion ℥v; mix. *Dose.* 1 to 2 tablespoonfuls.

MIXTURE, ETHER AND TURPENTINE. *Syn.* M. ÆTHERIS CUM TEREBINTHINA. *Prep.* (Orfila.) Sulphuric ether ʒj; oil of turpentine ʒij; white sugar ʒiv; triturate and add gradually water ℥ij. *Dose.* fʒij every 15 minutes; in poisoning by nux vomica.

MIXTURE, EXPECTORANT. *Syn.* M. EXPECTORANS. *Prep.* I. (Thomson.) Almond mixture f℥v; ipecacuanha and tincture of squills, of each fʒj; sirup of tolu fʒvj; mix. *Dose.* 1 tablespoonful; in humoral asthma, catarrh, &c., when the cough is urgent.

II. (Collier.) Oxymel of squills and mucilage, of each ℥j; sirup of marshmallows ℥ij, (camphor julep ℥iij;) mix. *Dose.* 1 to 2 tablespoonfuls 2 or 3 times a day; in coughs, hoarseness, asthma, &c.

MIXTURE, FEBRIFUGE. *Syn.* M. FEBRIFUGA. (See MIXTURE, DIAPHORETIC.)

MIXTURE, GENTIAN, (compound.) *Syn.* M. GENTIANÆ COMPOSITA. *Prep.* (P. L.) Compound infusion of gentian f℥xij; compound in-

usion of senna f ℥vj; compound tincture of cardamoms f℥ij; mix. Tonic, stomachic, and aperient. Dose. 2 to 3 tablespoonfuls, in dyspepsia accompanied with constipation.

MIXTURE, GUAIACUM. *Syn.* M. Guaiaci. (P. L. & E.) *Prep.* I. (P. L.) Gum guaiacum ʒiij; sugar ℥ss; triturate together, add mucilage ℥ss, again triturate and further add cinnamon water f℥xix; mix well. *Dose.* 1 to 3 tablespoonfuls, 2 or 3 times a day; in chronic rheumatism, gout, &c.

II. (*Alkaline.*) Guaiacum and quicklime, of each 1 oz.; triturate together, and add water 1 pint.

III. (*Ammoniated.*) Guaiacum ʒij; carbonate of ammonia ʒiss; barley water ℥viij. *Dose.* 1 to 2 tablespoonfuls 2 or 3 times a day.

MIXTURE, GUM. *Syn.* Mucilage. Mucilage de Gomme Arabique, (*Fr.*) Schleim de Arabiche Gummi, (*Ger.*) Mucilago, (P. E.) Mistura Acaciæ, (P. L.) M. Gummi Arabici, (P. D.) *Prep.* I. (P. L.) Powdered gum acacia ℥x; boiling water 1 pint; rub together till dissolved. The P. E. & D. order the gum unpowdered. Used to render oily and resinous substances miscible with water. "*Oils* require ¾ their weight; *balsams* and *spermaceti*, equal parts; *resins* 2 parts; and *musk*, 5 times its weight," for this purpose. (Montgomery.)

II. (*M. Acaciæ.* P. E.) Mucilage f ʒiij; sweet almonds (blanched) ℥j ʒij; white sugar ʒv; water a quart; make an emulsion or mixture, and strain through calico. *Dose.* 2 to 3 tablespoonfuls, as a demulcent and emollient, ad libitum, in coughs, &c. See Almond Mixture.

MIXTURE, HARTSHORN. *Syn.* Hartshorn Drink. M. Cornu usti. *Prep.* Burnt hartshorn ℥ij; gum ℥j; water 2½ pints; boil to ℥xxxij, and strain. Demulcent. *Dose.* 2 to 3 tablespoonfuls ad libitum, in coughs, hoarseness, &c.

MIXTURE, HEMLOCK. *Syn.* M. Conii Comp. *Prep.* (Copland.) Extract of hemlock ʒss; carbonate of soda 45 grs.; decoction of liquorice f℥vss; spirit of pimento f ʒiij; mix. *Dose.* 1 to 3 tablespoonfuls, in hooping-cough and pulmonary irritations.

MIXTURE, HOOPING-COUGH. *Syn.* M. Cupri Sulphatis. *Prep.* (Chevasse.) Sulphate of copper 1 gr.; aniseed water ℥iij; sirup of poppies ℥j; mix. *Dose.* 40 drops to ʒij.

MIXTURE, IODINE. *Syn.* M. Iodinii. *Cum Decoct. Graminis. Iodureted Dog's Grass.*) *Prep.* I. (Majendie.) Decoction of dog's grass ℥xxxij; iodide of potassium ʒj; orange sirup ℥ij; mix.

II. (*Cum Sarza.*) *Prep.* (Majendie.) Decoction of sarsaparilla ℥xxxij; iodide of potassium ʒj; orange sirup ℥ij; mix. Both the above may be taken in doses of 2 to 4 tablespoonfuls 3 or 4 times a day, in the usual cases in which iodine is administered.

MIXTURE, MAGNESIA, (BICARBONATE.) *Syn.* M. Magnesiæ Bicarbonatis. *Prep.* Liquid magnesia (Dinneford's or Murray's) ℥vj; orange sirup, sirup of ginger, and compound tincture of cardamoms, of each ʒij; aromatic spirit of ammonia f ʒvj; mix. *Dose.* 1 to 2 tablespoonfuls every 2 or 3 hours in acidity, dyspepsia, heartburn, lowness of spirits, &c. An excellent medicine.

MIXTURE, MARSHMALLOW. *Syn.* M. Althææ. *Prep.* (P. E.) Marshmallow root ℥iv; stoned raisins ℥ij; water 5 pints; boil to 3 pints, and strain through linen. Demulcent *Dose.* A few spoonfuls ad libitum, so as to take 1 to 3 pints in the 24 hours; in strangury, calculus, coughs, &c.

MIXTURE, MUSK. *Syn.* M. Moschi *Prep.* (P. L.) Musk, powdered gum, and sugar, of each ʒiij; triturate well together, then add gradually, rose water 1 pint, still continuing the trituration. Each fluid ounce contains 9 grains of musk. *Dose.* 2 to 4 tablespoonfuls, as a stimulant, antispasmodic, and anodyne; in hysteria, epilepsy, chorea, tetanus, low fevers, &c.

MIXTURE, MYRRH. *Syn.* M. Myrrhæ. *Prep.* (Copland.) Myrrh ʒiss; add gradually, triturating all the time, decoction of liquorice f ℥vj; strain. *Dose.* 1 to 2 tablespoonfuls twice or thrice a day, combined with carbonate of soda, dilute muriatic acid, or paregoric, in debility, and diseases of the digestive organs.

MIXTURE, NARCOTIC. *Syn.* M. Narcotica. *Prep.* (W. Cooley.) Laudanum ʒiss; sirup of poppies, sulphuric ether, and spirits of cinnamon, of each ℥j; tincture of henbane, ʒiiss; water ℥iiss; mix. *Dose.* 1 to 2 tablespoonfuls at the commencement of the hot fit of ague.

MIXTURE, OIL. *Syn.* M. Olei Amygdalæ. *Prep.* (St. B. H.) Oil of almonds and mucilage, of each ℥iss; triturate, and add gradually water ℥v. Demulcent, emollient. *Dose.* 2 or 3 tablespoonfuls occasionally. The M. Olei cum Manna is made by substituting manna ℥iss, for the gum.

MIXTURE, OPIATE. *Syn.* M. Opiata. *Prep.* Laudanum f ʒij; solution of acetate of ammonia and water, of each ℥iij; mix. *Dose.* 1 to 2 tablespoonfuls to relieve pain, and procure sleep in fevers, &c.

MIXTURE, PHOSPHORUS. *Syn.* M. Phosphori. *Prep.* (Soubeiran.) Phosphorized oil ʒij; mucilage ʒiv; triturate together, adding gradually sirup ℥ij; and peppermint water ℥iij.

MIXTURE, PRUSSIC ACID. *Syn.* M. Acidi Hydrocyanici. *Prep.* Medicinal prussic acid 15 minims; simple sirup ℥j; water ℥v; mix. *Dose.* 1 tablespoonful 2 or 3 times daily. Each dose contains 1¼ drops of medicinal prussic acid.—
⁎⁎⁎ Shake the bottle before pouring out the dose.

MIXTURE, PURGING. *Syn.* M. Purgans. *Prep.* Any of the purging salts ℥ij; infusion of senna ℥v; sirup of orange-peel ℥j; tincture of ginger ℥ss; spirit of pimento ʒij; mix. *Dose.* 1 to 3 tablespoonfuls early in the morning; in stomach complaints, &c.

MIXTURE, REFRIGERANT. *Syn.* M. Refrigerans. *Prep.* Borax ʒij; solution of acetate of ammonia ℥j; lemon-juice ℥ivss; sweet spirits of nitre ʒiij; mix and dissolve. Diuretic, diaphoretic, and cooling, in colds accompanied with fever, &c. *Dose.* 1 or 2 tablespoonfuls 2 or 3 times a day.

MIXTURE, RHUBARB. *Syn.* M. Rhæi. *Prep.* I. (*M. Rhæi Comp. Gregory's Mixture.*) Compound powder of rhubarb (P. E.) ʒiij; peppermint water f ℥xvj; mix.

II. (Sprague.) Powdered rhubarb and carbonate of soda, of each ʒiss; decoction of liquorice f℥viss; tincture of orange peel (or orange sirup) ʒvj; mix. Both the above are excellent stomachics and mild aperients. *Dose.* 1 to 3 tablespoonfuls 2 or 3 times a day.

MIXTURE, SALINE. (Febrifuge.) *Syn.* M. SALINA FEBRIFUGA. *Prep.* Bicarbonate of potassa ʒij; nitre ℈ij; sirup ʒiij; lemon-juice f℥ij; sweet spirits of nitre ʒiss; water ℥iiiss; mix. *Dose.* 1 to 3 tablespoonfuls in fevers, &c.

MIXTURE, SCAMMONY. *Syn.* M. SCAMMONII. *Prep.* I. (P. E.) Resin of scammony 7 grs.; unskimmed milk f℥iij; gradually mix, triturating all the time, so as to form an emulsion. Purgative. *Dose.* One half.

II. (*Planche's Purgative Potion.*) To the last add white sugar ʒij, and cherry laurel (or bitter almond) water 4 drops. This is the most tasteless and pleasant purgative that can be taken.

MIXTURE, SEDATIVE. *Syn.* M. SEDATIVA. *Prep.* Aromatic confection ʒiij; mucilage and spirit of sal volatile, of each ʒij; tincture of asafœtida and sirup of poppies, of each ℥ss; laudanum and tincture of henbane, of each ʒiss; water f℥iiiss; mix. *Dose.* 1 to 2 tablespoonfuls 2 or 3 times a day.

MIXTURE, SENNA. *Syn.* BLACK DRAUGHT. M. SENNÆ. M. SENNÆ COMPOSITA. *Prep.* (Guy's H.) Senna and mint, of each ℥j; boiling water ℥xxxij; infuse for 2 hours, strain, and add Epsom salts ℥vj; shake till dissolved. *Dose.* 1 to 2 oz. Purgative. See BLACK DRAUGHT.

MIXTURE, SQUILL. *Syn.* M. SCILLÆ. POTION SCILLITIQUE. *Prep.* (P. Cod.) Oxymel of squills ʒiv; hyssop water ℥iij; peppermint water ℥j; sweet spirits of nitre ℥ss. Expectorant. *Dose.* 1 to 2 tablespoonfuls 3 or 4 times a day, in coughs, asthma, &c.

MIXTURE, STEEL. *Syn.* GRIFFITH'S MIXTURE. COMPOUND IRON MIXTURE. M. FERRI COMPOSITA, (P. L. E. and D.) M. FERRI PROTOXYDI. *Prep.* I. (P. L.) Carbonate of potash ʒj; powdered myrrh ʒij; spirit of nutmeg ℥j; triturate together, and while rubbing, add gradually sugar ʒij; rose water f℥xviij; mix well; then add sulphate of iron (powdered) ℈iss, and place it at once in a bottle, which must be kept closely corked. *Dose.* 1 to 2 oz., 3 or 4 times a day, as a mild and genial tonic and stimulant, when there is no determination of blood to the head.

II. (Donovan.) Sulphate of iron ʒiv; calcined magnesia ℈ij; water ℥vj; tincture of quassia fʒij; mix in a bottle, cork close, and agitate. It must be kept from the air. *Dose.* 1 to 2 tablespoonfuls, as last.

III. (M. FERRI AROMATICA, P. D. HEBERDEN'S INK. ATRAMENTUM HEBERDII.) Powdered cinchona ℥j; bruised calumba root ʒiij; bruised cloves ʒij; iron filings ℥ss; peppermint water ℥xvj; digest in a close vessel for 3 days, agitating frequently, then strain, and add tincture of cardamoms (comp.) ℥iij; tincture of orange-peel ʒiij. Bitter, stomachic, and aromatic. *Dose.* 1 or 2 tablespoonfuls, or more, 3 or 4 times a day.

MIXTURE, STIMULANT. *Syn.* M. STIMULANS. *Prep.* I. Carbonate of ammonia ʒss; peppermint water ℥v; orange sirup ʒvj; tincture of cardamoms (comp.) ʒij; mix. *Dose.* 1 tablespoonful for lowness of spirits, vapors, and when the patient is faint.

II. Camphor julep ℥iv; ether, spirit of aniseed, and tincture of cardamoms, (comp.,) of each ʒij; sirup ℥j; tinctures of tolu and ginger, of each ʒj; peppermint water ℥iss; mix. *Dose.* As last. In lowness of spirits, &c., accompanied with heartburn, colic, or flatulence.

MIXTURE, STRYCHNINE. *Syn.* M. STRYCHNIÆ. *Prep.* (Majendie.) Pure strychnine 1 gr.; white sugar ʒij; acetic acid 3 drops; water f℥ij; mix. *Dose.* A teaspoonful night and morning; in palsy. Each fʒ contains one-sixteenth gr. of strychnine.

MIXTURE, TARTAR EMETIC. *Syn.* M. ANTIMONII POTASSIO-TARTRATIS. *Prep.* Antimonial wine and simple sirup, of each ℥ss; nitre ℈ij; camphor julep ℥v; mix. Diaphoretic. *Dose.* 1 dessert-spoonful every 2 hours.

MIXTURE, TONIC. *Syn.* STRENGTHENING MIXTURE. M. TONICA. *Prep.* I. (Collier.) Decoction of bark f℥vss; tincture of do. f℥iij; aromatic confection ℈j; aromatic spirit of ammonia fʒj; mix.

II. (Thomson.) Infusion of calumba f℥vss; compound tincture of cinnamon and orange sirup, of each fʒij; mix.

III. Infusion of cascarilla ℥v; tincture of orange peel ʒvij; aromatic sulphuric acid ʒij; mix. *Dose.* 1 to 3 tablespoonfuls 2 or 3 times a day; in debility of the digestive organs, to check severe vomiting, &c.

MIXTURE, TURPENTINE. *Syn.* M. TEREBINTHINÆ. *Prep.* (Carmichael.) Oil of turpentine ℥j; yelk of one egg; triturate together; add confection of almonds ℥j; again triturate, and further add, gradually, orange sirup ℥ij; compound tincture of lavender fʒiv; oil of cinnamon 4 drops; water f℥iv. In iritis.

MIXTURE, VALERIAN. *Syn.* M. VALERIANÆ. *Prep.* (St. B. H.) Bruised valerian root ʒij; boiling water ½ pint; macerate 2 hours; strain, and add, powdered valerian ʒiv. Antispasmodic.

MIXTURE, WHORTLEBERRY. *Syn.* M. UVÆ URSI. *Prep.* I. Infusion of whortleberry leaves ℥viiss; carbonate of potash ʒij; extract of hemlock 20 grs.; sirup of poppies ℥j; tincture of ginger ʒiij; mix. *Dose.* 2 to 3 tablespoonfuls in chronic diseases of the urinary organs.

II. Infusion of whortleberry leaves ℥viiss; dilute sulphuric acid ʒij; tincture of digitalis ʒj; sirup of poppies ʒiij; mix. *Dose.* As last. In chronic inflammation of the larynx, trachea, and mucous membranes of the urinary organs.

MIXTURE, WORM. *Syn.* M. VERMIFUGA. *Prep.* I. (Collier.) Sulphate of iron ℈j; infusion of quassia f℥viij; mix. *Dose.* Two tablespoonfuls every morning fasting.

II. (Richard.) Root of male fern ℥j; water ℥ix; boil to ℥vj, strain, and add sulphuric ether ʒj; sirup of tansy ℥j.

III. (Copland.) Valerian ʒij; wormseed ʒiv; boiling water ℥viij; macerate 1 hour; strain, and add, asafœtida ʒj, previously triturated with the yelk of one egg.

MIXTURE, ZINC. *Syn.* M. ZINCI SULPHATIS. *Prep.* (Collier.) Sulphate of zinc 5 grs.; sulphate of quinine 10 grs.; compound infusion

of roses f ℥ij; mix. Tonic. *₊* "I have found his mixture very efficacious in the cure of *barking* (gastric?) coughs manifestly of a spasmodic character." (Collier's Pharm., p. 178.) *Dose*. A teaspoonful 2 or 3 times a day in a glass of water.

MOCHLIQUE DES FRERES DE LA CHARITE. *Prep*. Finely-powdered glass of antimony 1 oz.; white sugar 2 oz.; triturate together. *Dose*. 20 to 30 grs.; said to be a specific in lead colic.

MOIREE METALLIQUE. *Syn*. Crystallized Tin. This is produced by the action, for a few seconds, of dilute nitro-muriatic acid on tin gently heated, then washing in hot water, drying, and lacquering. The degree of heat and the strength of the acid modify the appearance. The following is the most approved method of producing this effect:—The plate iron to be tinned is dipped into a tin-bath, composed of 200 parts of pure tin, 3 parts of copper, and 1 part of arsenic. Thus tinned, the sheet iron is then submitted to the seven following operations:—1. Immersing in lye of caustic potassa, and washing.—2. Immersing in diluted aqua regia, and washing.—3. Immersing in lye of caustic potassa, and washing.—4. Quickly passing through nitric acid, and washing.—5. Immersing in a lye of caustic potassa, and washing.—6. Immersing in aqua regia, and washing.—7. Immersing in a lye of caustic potassa, and washing. The coat of oxide must be entirely removed at each washing, and the last washing should be in hot water. The varnish recommended is copal in spirit. (Herberger.)

MOLUCCA, BALM OF. *Prep*. Clean spirit (22 u. p.) 1 gallon; bruised cloves ½ oz.; bruised mace ¾ dr.; infuse for a fortnight in a corked bottle or carboy, then filter, color with burnt sugar, and add lump sugar 4½ lbs., dissolved in pure water ½ gallon; mix well and bottle. A pleasant cordial.

MOLYBDENUM. *Syn*. Molybdena. Molybdene, (*Fr.*) Molybdan, (*Ger.*) Molybdenum, (*Lat.*, from μολυβδος, *lead*, because its ore was first supposed to be plumbago.) A very rare metal, having a white color, and the sp. gr. of about 8·625. It is brittle and very infusible. It was discovered by Hielm in 1782. It is obtained by exposing molybdic acid, mixed with charcoal and placed in a covered crucible, to the strongest heat of a smith's forge. With oxygen it forms *a protoxide* and *binoxide*, and *molybdic acid*. With chlorine it forms a *protochloride* and *bichloride*. With sulphur it unites to form 2 or more *sulphurets*. The only one of the above that possesses any practical interest is molybdic acid.

MOLYBDIC ACID. *Syn*. Acidum Molybdicum. *Prep*. I. Digest finely-powdered sulphuret of molybdenum ore in nitromuriatic acid until completely decomposed, then briskly heat the residue. A white heavy powder.

II. Well roast native sulphuret of molybdena; powder, dissolve in water of ammonia, and precipitate with nitric acid. Small white scales.

Prop., &c. Soluble in 570 parts of water, and the solution reddens litmus paper; dissolves in the alkalis forming *alkaline molybdates*, from which it is again precipitated by strong acids. It is used in the preparation of molybdenum blue.

MONOCHROMATIC LAMP. A lamp fed with a mixture of a solution of common salt and spirit of wine. It gives a yellow light, and makes every object illuminated by it, appear either yellow or black. (Brewster.)

MONTANIN. The bitter principle of St. Lucia bark.

MORDANTS, (IN DYEING.) Substances employed to fix the coloring matters of dye-stuffs on organic fibres. The principal mordants are alumina, and the oxides of iron and tin. See Dyeing and Calico Printing.

MOROXYLIC ACID. A sour principle obtained by Klaproth from the bark of the white mulberry, (morus alba.) It is found under the form of *moroxylate of lime*.

MORPHIA. *Syn*. Morphina. Morphium. Morphine, (*Fr.*) Morphin, (*Ger.*) Morphia, (*Lat.*, from *Morpheus*, the god of sleep.) The hypnotic principle of opium. It was discovered by Ludwig in 1688, but it was first obtained pure, and its precise nature pointed out by Sertuerner in 1804. Morphia is peculiar to the poppy tribe.

Prep. I. (P. L.) Muriate of morphia ℥j; water 1 pint; dissolve and precipitate with liquor of ammonia f ʒv, (or q. s.,) previously diluted with water ℥j, employing agitation; wash the precipitate in distilled water, and dry at a gentle heat.

Remarks. By a similar process morphiate may be obtained from its other salts. Good opium yields from 10 to 13% of morphia.

II. (Merck.) Precipitate a cold aqueous infusion of opium by carbonate of soda in excess, wash the precipitate first with *cold* water and then with *cold* alcohol of 0·85; dissolve in weak acetic acid, filter through animal charcoal, precipitate with ammonia, again wash with cold water, dissolve in alcohol, and crystallize. A good process where alcohol is cheap. (See Opium.)

Prop. As prepared above, it is a snow-white crystalline powder; but when crystallized in alcohol, it forms brilliant prismatic crystals of adamantine lustre. It exerts an alkaline reaction on test paper, and imparts a perceptible bitter taste to water. It is scarcely soluble in water and ether, but freely so in alcohol; it also dissolves in the fixed and volatile oils, and in solutions of the alkalis. With the acids it forms salts, which are mostly soluble. These may be made by the direct solution of the alkaloid in the dilute acid. The only ones of importance are the acetate, sulphate, and muriate.

Uses. Morphia and its salts are exhibited either in substance, made into pills, or in solution; or externally, in fine powder applied to the dermis, denuded of the cuticle. They are principally employed as anodynes and hypnotics in cases in which opium is inadmissible. *Dose*. ⅛ to ¼ gr.; externally ½ to 1½ grs. Pure morphia is chiefly used to make the acetate and its other salts.

Pur. Pure morphia is scarcely soluble in cold water, sparingly so in boiling water, and readily so in alcohol. This solution is alkaline to test paper, and by evaporation leaves crystals, which are wholly dissipated by heat. It is soluble in pure potassa. (P. L.)

Tests. Morphia and its salts are,—1. *Reddened* by nitric acid, and form orange red solutions, darkened by ammonia in excess, and ultimately

turning yellow, with the production of oxalic acid. —2. They are turned *blue* by sesquichloride of iron, either at once, or on the addition of an alkali, and this color is destroyed by water, and by alkalis, or acids in excess.—3. Iodic acid added to their solutions, turns them yellowish brown, by setting iodine free, and the liquid forms a blue compound with starch.—4. Alkaline carbonates produce a white precipitate soluble in acetic acid.—5. The pure alkalis also produce a white precipitate soluble in acetic and in excess of the precipitant.

MORPHIA, ACETATE OF. *Syn.* MORPHIÆ ACETAS, (P. L. and E.) *Prep.* (P. L.) Morphia ℈vj; acetic acid f ʒiij; distilled water f ℥iv; dissolve the morphia in the mixed fluids, filter, gently evaporate, and crystallize.

Remarks. The acetate of morphia of commerce is usually in the form of a whitish powder, and is prepared by the mere evaporation of the solution to dryness by a gentle heat. During the process a portion of the acetic acid is dissipated, and hence this preparation is seldom perfectly soluble in water, unless it be slightly acidulated with acetic acid. Anodyne, and hypnotic. *Dose.* ⅛ to ½ gr., in fevers and other inflammatory disorders where opium is inadmissible.

Pur. "100 measures of a solution of 10 grs. in f ℥ss of water, and 5 minims of acetic acid, heated to 212° and decomposed by a very slight excess of ammonia, yield by agitation a precipitate which, in 24 hours, occupies 15½ measures of the liquid." (P. E.)

MORPHIA, HYDROCHLORATE OF. *Syn.* MURIATE OF MORPHIA. MORPHIÆ HYDROCHLORAS, (P. L.) MORPHIÆ MURIAS, (P. E.) *Prep.* (P. L.) Macerate sliced opium lb. j, in water 4 pints for 30 hours, then bruise it, digest for 20 hours more, and press it; macerate what remains a second and a third time in water until exhausted; mix the liquors, evaporate at 140° to the consistence of a sirup, add water 3 pints, and after defecation decant the clear; gradually add to this liquid crystallized chloride of lead ℥ij, (or q. s.,) dissolved in boiling water 4 pints, till it ceases to produce a precipitate; decant the clear, wash the residuum with water, and evaporate the mixed liquids as before, that crystals may form. Press the crystals thus obtained in a cloth, then dissolve them in water 1 pint, add freshly-burnt animal charcoal ℥iss, digest at 120°, filter, wash the residue of charcoal, and cautiously evaporate the mixed liquors, that *pure* crystals may form. To the decanted liquor, from which the crystals were first separated, add water 1 pint, and drop in solution of ammonia, frequently shaking, till all the morphia is precipitated; wash the precipitate with distilled water, saturate it with muriatic acid, digest with animal charcoal ℥ij, filter, wash the filter as before, and evaporate the mixed liquors, cautiously, as above, that *pure* crystals may be produced.

II. (P. E.) Exhaust opium ℥xx, with water 1 gallon, in the quantity of a quart at a time, as above; evaporate the mixed liquors over the vapor bath to 1 pint, add muriate of lime ℥j, dissolved in water f ℥iv, mix, and set the liquid aside to settle; then decant the clear, wash the sediment with water, add the washings to the other liquid, and evaporate sufficiently as before, that it may solidify on cooling; subject the cooled mass to very strong pressure in a cloth, redissolve the cake in warm water, add a little powdered white marble, filter, acidulate with muriatic acid, and again concentrate in the vapor bath for crystallization; subject the crystals as before to powerful pressure, redissolve, and clarify with powdered marble and muriatic acid, and concentrate and crystallize until a snow-white mass be obtained. The above is the process of Gregory and Robertson, and is one of the easiest and most productive on the large scale. To procure the salt quite white, 2 to 4 crystallizations are required, according to the power of the press employed. The Edinburgh College recommends, on the small scale, the solution after 2 crystallizations to be decolored by means of animal charcoal, but, on the large scale, to purify the salt by repeated crystallizations alone.

III. (Mohr.) Quicklime 1 part; reduce it to a milk with water, and add it to a concentrated infusion of opium made with opium 4 to 6 parts; boil for a short time, filter while hot through linen, gently evaporate till the solution becomes of only double the weight of the opium employed, and while still hot, add powdered sal ammoniac in slight excess, (about 1 oz. to each pound of opium;) on cooling, colored crystals of muriate of morphia will be deposited, and must be purified by a second solution in lime and precipitation by sal ammoniac. This process is remarkably simple, and in many points is preferable to either of the preceding, especially on the small scale.

Pur., Uses, &c. Pure muriate of morphia is "snowy white; entirely soluble; solution colorless; loss of weight at 212° not above 13⅜; 100 measures of a solution of 10 grs., in water f ℥ss, heated to 212°, and decomposed with agitation by a *faint* excess of ammonia, yield a precipitate which, in 24 hours, occupies 12½ measures of the liquid." (P. E.) *Dose.* One-sixth to one-half gr., as an anodyne and narcotic.

Remarks. The opium which yields the largest quantity of precipitate by carbonate of soda, yields muriate of morphia, not only in the greatest proportion, but also with the fewest crystallizations. Smyrna opium contains most morphia. The muriate of morphia of the shops is usually, like the acetate, under the form of powder. Of all the salts of morphia, the muriate appears to be the most suitable for medical purposes.

MORPHIA, MECONIATE OF. *Prep.* I. (*Neutral.*) Saturate meconic acid with morphia, evaporate, and crystallize.

II. (*Bimeconate.*) Dissolve 288¼ grs. of morphia in an aqueous solution of 202 grs. of meconic acid, evaporate and crystallize; or merely gently evaporate to dryness.

Remarks. The meconic acid for this purpose may be obtained by precipitating a cold and filtered infusion of opium by acetate of lead, washing the precipitate with water, suspending in pure water, decomposing it by sulphureted hydrogen, filtering, evaporating, and crystallizing. Morphia exists in opium under the form of *bimeconate*, and hence this preparation has been preferred by some practitioners. A solution of this salt for medical purposes may be directly prepared from opium, by treating its infusion in cold water with a little animal charcoal, filtering, gently evaporating to dryness, redissolving in cold water, filtering, and re-

peating the treatment with animal charcoal. The dose of the dry bimeconate is ¼ gr. or more; and of the meconate rather less

MORPHIA, SULPHATE OF. *Syn.* MORPHIÆ SULPHAS. *Prep.* Saturate very dilute sulphuric acid with morphia, evaporate to one-half, add a little animal charcoal, continue the evaporation for a short time longer at a gentle heat, filter while hot, and abandon it to spontaneous evaporation. It is decomposed by driving off the water of crystallization. Anodyne and narcotic. *Dose.* ¼ to ½ gr.

MORSULI ACETI. *Prep.* White sugar 1 lb.; form into lozenges with acetic acid 2 oz.

MORSULI AROMATICI. *Prep.* White sugar 1 lb.; dissolve in a little water, boil to a full candy height, and when half cold, add blanched sweet almonds and orange peel, of each 1 oz.; cinnamon ½ oz.; ginger ℈j; all cut into small pieces; form into drops or lozenges.

MORSULI CITRI. *Prep.* White sugar 1 lb.; lemon juice 2½ oz.; eleosaccharum of lemons 4 oz.; mix, divide, and dry.

Remarks. The above morsuli are used as lozenges or masticatories. The word *morsulus* signifies a little mouthful.

MOSAIC GOLD. *Syn.* OR MOLU. *Prep.* (*Parker and Hamilton's patent.*) Copper and zinc equal parts; melt together at the lowest possible temperature at which copper will fuse, and stir so as to produce a perfect admixture of the metals; then add gradually, small portions of zinc at a time, until the alloy acquires the proper color, which is perfectly *white*, while in the melted state. It must then be at once cast into figured moulds. This alloy should contain from 52 to 55% of zinc.

MOUTH GLUE. *Syn.* INDIAN GLUE. COLLE À BOUCHE. *Prep.* Best cake glue q. s.; dissolve in a little water, add brown sugar a small quantity, and some essence or juice of lemons, pour it into greased moulds, and dry it. When used, it is wetted with the tongue, and rubbed on the paper to be joined. (See GLUE, PORTABLE.)

MOXAS. Substances burnt upon the body, for the purpose of acting as counter-irritants, and allaying deep-seated pains, and inflammation. They have been used in gout, rheumatism, &c. The small cone constituting the moxa, is placed upon the part, lighted, and allowed to burn to its base. The Chinese moxas are made of the downy portion of the leaves of a species of wormwood, (artemisia sinensis;) but various other substances, as the pith of the sunflower, cotton, or paper, soaked in a weak solution of nitrate, chlorate, or chromate of potash, will answer as well. The actual cautery is said to be preferable.

MUCIC ACID. *Syn.* SACCHOLACTIC ACID. An acid discovered by Scheele, and obtained in a state of purity by digesting 1 part of sugar of milk in 4 parts of nitric acid, (sp. gr. 1·42,) diluted with 1 part of water, and applying heat till the effervescence ceases; on cooling, the acid is deposited. Gum may be substituted for sugar of milk, but yields a less pure acid. Mucic acid is a white, crystalline powder, soluble in boiling water and in oil of vitriol, to which it imparts a crimson color. By dry distillation it yields *pyromucic acid*, and other products; with the bases it forms salts called *mucates*. The alkaline mucates are soluble,—the earthy and metallic mucates insoluble.

MUCILAGE. *Syn.* MUCILAGO, (*Lat.*) An aqueous solution of gum, or any similar substance.

MUCILAGE, GUM. (See GUM MIXTURE.)

MUCILAGE, QUINCE. (See DECOCTION OF QUINCE SEEDS.)

MUCILAGE, STARCH. (See DECOCTION OF STARCH.)

MUCILAGE OF TRAGACANTH. *Syn.* MUCILAGO TRAGACANTHÆ. *Prep.* (P. E.) Tragacanth ʒij; boiling water f℥ix; macerate 24 hours, triturate, and press through linen. Used to make up pills, to suspend heavy powders in liquids, as an application to burns, &c.

MUDARINE. A peculiar substance possessing powerful emetic properties, found in the bark of the root of calotropis mudarii, (Mudar.) It is soluble in water and alcohol, and its aqueous solution gelatinizes when heated.

MUFFINS. *Prep.* Flour 1 quartern; warm milk and water 1½ pint; yeast ¼ pint; salt 2 oz.; mix for 15 minutes, then further add flour ¼ peck, make a dough, let it rise 1 hour, roll it up, pull it into pieces, make them into balls, put them in a warm place, and when the whole dough is made into balls, shape them into muffins, and bake them on tins; turn them when half done, dip them into warm milk, and bake to a pale brown.

MULTUM. A mixture of extract of quassia and liquorice used by fraudulent brewers instead of malt and hops.

MUM. A beverage prepared from wheat malt, in a similar way to ordinary beer from barley malt. It was formerly much drunk in England; but its use at the present day is chiefly confined to Germany.

MUMMY. The mixed resinous mass with which the Egyptian corpses have been preserved, reduced to powder. *Used* by artists; a good glazing color, but dries slowly. Burnt Prussian blue, or a mixture of asphaltum and burnt sienna melted together, are good substitutes.

MUREXIDE. *Syn.* PURPURATE OF AMMONIA. *Prep.* Hydrated alloxan 7 grs.; alloxantine 4 grs.; water 240 grs.; dissolve by boiling, and add the solution to 80 grs. measure of a cold and strong solution of carbonate of ammonia; crystals of murexide will deposite as the liquid cools. It forms iridescent crystals, having a metallic lustre. It is soluble in boiling water, (Gregory and Liebig.) When murexide is dissolved in a solution of caustic potassa, heat applied till the blue color disappears, and dilute sulphuric acid added in excess, silky crystalline scales are deposited, which are called MUREXAN OR PURPURIC ACID. It is soluble in ammonia and the fixed alkalis, and its solution in the former by exposure to the air becomes purple, and deposites brilliant crystals of murexide.

MURIATE. *Syn.* HYDROCHLORATE. MURIAS; HYDROCHLORAS, (*Lat.*) A compound of a base and muriatic acid. From the discoveries of Davy, and the more recent researches of various continental chemists, it appears probable that the muriates or hydrochlorates are direct compounds of the bases and chlorine, or are in reality *chlorides*, of which hydrogen or water is not an essential part. Most of the MURIATES may be made by directly saturating the acid with the base, or with its hydrate, oxide, or carbonate, and evaporating

and crystallizing. (See CHLORIDES, CHLORINE, and MURIATIC ACID.)

MURIATIC ACID. *Syn.* HYDROCHLORIC ACID. CHLOROHYDRIC DO. MARINE ACID. ACID OF SALT. SPIRIT OF SALT. ACIDUM HYDROCHLORICUM, (P. L.) DO. MURIATICUM, (P. E. & D.) SPIRITUS SALIS. ACIDE MURIATIQUE; ACIDE HYDROCHLORIQUE; ACIDE CHLOROHYDRIQUE, (*Fr.*) SALZSAURE, (*Ger.*) An acid compound of chlorine and hydrogen, long known in the state of solution, under the name of marine acid or spirit of salt; but first obtained in the pure or gaseous form by Priestley, in 1772.

Prep. I. (P. L.) Sulphuric acid ℥xx; water ℥xij; mix in a retort, and when cold add to it dried chloride of sodium lb. ij; and gradually distil in a sand-bath into a receiver containing water f℥xij. Sp. gr. 1·160.

II. (P. E.) Dried purified muriate of soda and pure sulphuric acid, of each 3 parts; water 1 part; mix as last, and distil with a gentle heat into a well-cooled receiver containing water 2 parts, as long as any liquid passes over. Sp. gr. 1·170.

III. (P. D.) Sp. gr. 1·160.

IV. (Winckler.) Dry and pure chloride of sodium 24 parts; pure oil of vitriol 44 parts; diluted with water 7 parts, and allowed to cool; mix in a large retort, and connect it by a rectangular bent glass tube, at least 3 feet long, with a capacious receiver, containing 20 parts of water, and well cooled. Distil 44 oz. of 30% by weight.

V. (Gregory.) Dry and pure salt 60 parts; pure sulphuric acid 98 parts, diluted with water to the sp. gr. 1·6; mix in an alembic furnished with a double-bent tube, the end of which is plunged about ¼ of an inch beneath the surface of the water in the receiver, (about 35 parts;) the latter must be well cooled. *Prod.* The first ⅔ is a fuming acid, sp. gr. 1·21—the last ⅓ about sp. gr. 1·12.

Remarks. The muriatic acid of commerce is now chiefly obtained from the manufacturers of carbonate of soda, who procure it as a secondary product. When, however, it is directly prepared from sea-salt, an iron or stoneware boiler, set in brickwork over an open fire, furnished with a stoneware head, and connected with a series of capacious double-necked stoneware bottles, usually constitutes the distillatory and condensing apparatus. The arrangement resembles that employed in the preparation of liquor of ammonia, (see page 58.) The formula of the London College is defective in ordering too little acid, by which means the product becomes contaminated with a portion of sulphuric acid, and the residue of the process rendered so hard and insoluble as to prevent its removal from the retort by ordinary means. The products of the other formulæ (II, IV, and V) are pure liquid hydrochloric acid, provided the materials employed be quite free from foreign admixture. Commercial muriatic acid may be purified by diluting it with an equal weight of water, gently heating it in a retort, and receiving the evolved gas into a fresh quantity of pure water. Iodine and arsenic may be removed by agitating it for a few minutes with some small pieces of bright copper foil previously to rectification. Commercial muriatic acid of the ordinary strength may be bought for 0½*d.* per lb. in quantity.

Prop. Pure muriatic acid is a colorless invisible gas, having a pungent odor and an acid taste, and fuming on coming into contact with air. It is irrespirable and uninflammable. Its sp. gr. is 1·2695, (Berzelius—1·2847 Thomson.) Under a pressure of 40 atmospheres it is liquid. Water at 40° F. absorbs 480 times its volume of this gas, and acquires the sp. gr. 1·2109, (Davy.) One cubic inch of water at 69° F. absorbs 418 cubic inches, and the sp. gr. becomes 1·1958, (Thomson.) The gas is obtained by gently heating the liquid acid. It must be collected over mercury.

Pure *liquid muriatic acid* is colorless, fumes in the air, evolves a strong odor of muriatic acid gas, is intensely sour, reddens vegetable blues, and erodes organic substances. It is entirely separated by heat from the water that holds it in solution. It dissolves many of the metals with the evolution of hydrogen gas; it also dissolves metallic oxides, and the majority of the bases, their hydrates, and carbonates; in each case forming the compounds termed *chlorides, muriates, chlorohydrates,* or *hydrochlorates.* The acid of the L. Ph. has the sp. gr. 1·160, and consists of 32·32% of real muriatic acid, and 67·68% of water. 100 grs. of it should exactly saturate 132 grs. of crystallized carbonate of soda. The muriatic acid of commerce has generally a straw yellow color.

Uses. Muriatic acid is used for various purposes in the arts, in chemistry, and in medicine. It is refrigerant, tonic, and antiseptic, in small doses diluted with water; but corrosive and poisonous in larger doses, or undiluted. *Dose.* 10 to 20 drops in a sufficient quantity of any bland diluent, in stomach complaints, typhus fever, syphilitic affections, worms, scrofula, &c. It is also used in gargles and lotions.

Ant. Chalk, whiting, or magnesia, mixed with water, or milk, white of eggs, and demulcents.

Pur. Pure muriatic acid is "colorless, and totally dissipated by heat. Largely diluted with distilled water, the solution is unaffected by chloride of barium, (or calcium,) ammonia, or its sesquicarbonate. It does not dissolve gold leaf even when heated. It does not bleach the solution of sulphate of indigo." (P. L.) Commercial muriatic acid usually contains iron and sulphuric acid, and frequently chlorine, nitrous acid, bromine, and sometimes selenious acid. The *first* may be detected by the precipitate it forms when the acid is supersaturated by ammonia,—the *second,* by giving a white precipitate with chloride of calcium or barium, or with the nitrate of lime or baryta,—the *third, fourth,* and *fifth,* by the power the acid possesses of dissolving gold leaf, and decoloring solution of indigo,—and the *last,* by the acid depositing a reddish powder (selenium) when long kept.

Estim. The strength of muriatic acid is usually estimated from its specific gravity; but it may be more correctly ascertained by the power it possesses to saturate the bases. See ACIDIMETRY.

Table of Muriatic Acid, by Dr. Ure

Acid of 1·20 in 100.	Specific gravity.	Chlorine.	Muriatic Gas.	Acid of 1·20 in 100.	Specific gravity.	Chlorine.	Muriatic Gas.	Acid of 1·20 in 100.	Specific gravity.	Chlorine.	Muriatic Gas.
100	1·2000	39·675	40·777	66	1·1328	26·186	26·913	32	1·0637	12·697	13·049
99	1·1982	39·278	40·369	65	1·1308	25·789	26·505	31	1·0617	12·300	12·641
98	1·1964	38·882	39·961	64	1·1287	25·392	26·098	30	1·0597	11·903	12·233
97	1·1946	38·485	39·554	63	1·1267	24·996	25·690	29	1·0577	11·506	11·825
96	1·1928	38·089	39·146	62	1·1247	24·599	25·282	28	1·0557	11·109	11·418
95	1·1910	37·692	38·738	61	1·1226	24·202	24·874	27	1·0537	10·712	11·010
94	1·1893	37·296	38·330	60	1·1206	23·805	24·466	26	1·0517	10·316	10·602
93	1·1875	36·900	37·923	59	1·1185	23·408	24·058	25	1·0497	9·919	10·194
92	1·1857	36·503	37·516	58	1·1164	23·012	23·650	24	1·0477	9·522	9·786
91	1·1846	36·107	37·108	57	1·1143	22·615	23·242	23	1·0457	9·126	9·379
90	1·1822	35·707	36·700	56	1·1123	22·218	22·834	22	1·0437	8·729	8·971
89	1·1802	35·310	36·292	55	1·1102	21·822	22·426	21	1·0417	8·332	8·563
88	1·1782	34·913	35·884	54	1·1082	21·425	22·019	20	1·0397	7·935	8·155
87	1·1762	34·517	35·476	53	1·1061	21·028	21·611	19	1·0377	7·538	7·747
86	1·1741	34·121	35·068	52	1·1041	20·632	21·203	18	1·0357	7·141	7·340
85	1·1721	33·724	34·660	51	1·1020	20·235	20·796	17	1·0337	6·745	6·932
84	1·1701	33·328	34·252	50	1·1000	19·837	20·388	16	1·0318	6·348	6·524
83	1·1681	32·931	33·845	49	1·0980	19·440	19·980	15	1·0298	5·951	6·116
82	1·1661	32·535	33·437	48	1·0960	19·044	19·572	14	1·0279	5·554	5·709
81	1·1641	32·136	33·029	47	1·0939	18·647	19·165	13	1·0259	5·158	5·301
80	1·1620	31·746	32·621	46	1·0919	18·250	18·757	12	1·0239	4·762	4·893
79	1·1599	31·343	32·213	45	1·0899	17·854	18·349	11	1·0220	4·365	4·486
78	1·1578	30·946	31·805	44	1·0879	17·457	17·941	10	1·0200	3·968	4·078
77	1·1557	30·550	31·398	43	1·0859	17·060	17·534	9	1·0180	3·571	3·670
76	1·1536	30·153	30·990	42	1·0838	16·664	17·126	8	1·0160	3·174	3·262
75	1·1515	29·757	30·582	41	1·0818	16·267	16·718	7	1·0140	2·778	2·854
74	1·1494	29·361	30·174	40	1·0798	15·870	16·310	6	1·0120	2·381	2·447
73	1·1473	28·964	29·767	39	1·0778	15·474	15·902	5	1·0100	1·984	2·039
72	1·1452	28·567	29·359	38	1·0758	15·077	15·494	4	1·0080	1·588	1·631
71	1·1431	28·171	28·951	37	1·0738	14·680	15·087	3	1·0060	1·191	1·224
70	1·1410	27·772	28·544	36	1·0718	14·284	14·679	2	1·0040	0·795	0·816
69	1·1389	27·376	28·136	35	1·0697	13·887	14·271	1	1·0020	0·397	0·408
68	1·1369	26·979	27·728	34	1·0677	13·490	13·863				
67	1·1349	26·583	27·321	33	1·0657	13·094	13·456				

MURIATIC ACID, DILUTE. *Syn.* Acidum Hydrochloricum dilutum, (P. L.) Acidum Muriaticum dilutum, (P. E.) *Prop.* Muriatic acid f℥iv; distilled water f℥xij; mix. *Used* for convenience in dispensing. *Dose.* 30 to 60 drops in simple infusion of roses or water. "The density of this preparation is 1·050." (P. E.)

MURIATIC ACID, HENRY'S. *Prep.* Muriatic acid diluted to sp. gr. 1·074. One measure will exactly saturate an equal quantity of his carbonate of potash-water, or pure ammonia-water, or two measures of pure potash-water, pure soda-water, or carbonate of ammonia-water. *Used* in assaying mineral water, &c.

MUSCLE POWDER. Oyster do. Made like cockle powder. Used to make sauces.

MUSHROOMS. Edible fungi. The species commonly eaten in England are the *agaricus campestris*, (common field or garden mushroom,) used to make ketchup, and eaten either raw, stewed, or broiled;—the *morchella esculenta*, (common morel,) used to flavor soups and gravies;—and the *tuber cibarium*, (common truffle,) also used as a seasoning. The following are said to be tests of the wholesomeness of mushrooms:—

1. Sprinkle a little salt on the spongy part or gills of the sample to be tried: if they turn yellow, they are poisonous; if black, they are wholesome.—2. False mushrooms have a warty cap, or else fragments of membrane adhering to the upper surface, are heavy, and emerge from a vulva or bag; they grow in tufts or clusters in woods, on the stumps of trees, &c.; whereas the true mushrooms grow in pastures.—3. False mushrooms have an astringent, styptic, and disagreeable taste.—4. When cut they turn blue.—5. They are moist on the surface, and are generally of a rose or orange color.—6. The gills of the true mushroom are of a pinky red, changing to a liver color.—7. The flesh is white.—8. The stem is white, solid, and cylindrical.—9. "Introduce a silver spoon, or a new shilling or sixpence, or an onion, into a vessel in which mushrooms are seething; if, on taking either of them out, they assume a dark discolored appearance, the circumstance denotes the presence of poison existing among them; if, on the other hand, the metal or onion on being withdrawn from the liquor wears its natural appearance, the fruit may be regarded as genuine, and of the right sort."

The best *antidote to poisonous mushrooms* is

tannin, or an infusion or decoction of galls. A strong emetic should also be given to remove them from the stomach.

MUSK. *Syn.* Musc, (*Fr.*) Moschus, (*Lat.* and *Ger.*) An odorous substance obtained from the musk deer, (*moschus moschiferus,*) an animal inhabiting the mountains of eastern Asia. It is imported from China, Bengal, and Russia. The Tonquin musk is most esteemed. Pod musk (*Moschus in vesicis, Tonquin pods, China do., Moschos Chinensis, Do. Tonquinensis*) is the bag in its natural state containing the musk. Grain musk (*Moschus in granis*) is the matter contained in the pods, and which constitutes true musk. The average weight of one of the pods is about ʒvj; that of the grain musk it contains about ʒij ℈ij. Musk is said to be antispasmodic in doses of 3 grains and upwards.

Pur. The musk of the shops is generally adulterated. Dried bullock's blood, or chocolate, is commonly employed for this purpose. The blood is rendered dry by heat, then reduced to *coarse* powder, and triturated with the genuine musk in a mortar along with a few drops of liquor of ammonia; it is then placed in the empty pods, or put into bottles, and sold as grain musk. The writer of this article has seen many pounds of dry blood thus employed, and sold for musk. There are only two ways of detecting this fraud, viz.—by the inferiority of the odor, or by an assay for the iron contained in the blood. Genuine musk often becomes nearly inodorous by keeping, but recovers its smell on being exposed to the fumes of ammonia, or by being moistened with ammonia water. The perfumers sometimes expose it to the fetid ammoniacal effluvia of privies for the same purpose. The following forms are current in trade for reducing musk, (*moschus reductus:*)—1. Musk 3 oz.; chocolate 2 oz.; ivory black 1 dr.; gently rub together in a mortar with a few drops of liquid ammonia.—2. Musk and dried goats' or bullocks' blood, equal parts; mix as last.—3. To the last add an equal part of angelica root.—4. Storax and aloes wood, of each 4 oz.; musk and civette, of each 4 dr.; mix as last.—5. Nutmegs, mace, cassia, cloves, and Indian nard or spikenard, of each 1 oz.; dried blood or chocolate 4 oz.; make a paste, dry, bruise to a proper fineness, and triturate it gently with ¼th of its weight of musk, adding a few drops of essence of musk, and ammonia water.—6. Hard toasted bread, dried blood, chocolate, and musk, equal parts; as last. *** The Chinese are said to be the most skilful adulterators of musk.

MUSK, FACTITIOUS. *Syn.* Moschus factitius. Do. artificialis. Resin of Amber. Resina Succini. *Prep.* Pour fʒiiiss of the strongest nitric acid upon fʒj of oil of amber placed in a glass tumbler; digest; an orange yellow resin remains, which is to be washed in water, and carefully dried.

Remarks. Elsner recommends the addition of 1 part of rectified oil of amber to 3 parts of fuming nitric acid, in a glass or porcelain vessel, kept cold to prevent the oil being carbonized. It smells strongly of musk, and is said to be antispasmodic and nervine. A tincture is made by dissolving ʒj in rectified spirit fʒx. *Dose.* fʒj, in hooping-cough, low fevers, &c.

*** Dr. Collier mentions an artificial musk, prepared by digesting for 10 days nitric acid ℥ss, on "fetid animal oil, obtained by distillation, ℥j; and by then adding rectified spirit 1 pint, and digesting the whole for a month." (Collier's Phar., p. 184.)

MUST. The expressed juice of grapes before fermentation.

MUST, FACTITIOUS. *Prep.* White sugar 2½ lbs.; cream of tartar 1 oz.; raisins chopped small, ½ lb.; boiling water 1 gallon; mix, and digest for 2 hours, and strain.

MUSTARD. *Syn.* Flour of Mustard. Sinapis Farina. The powdered mustard of the shops is very frequently adulterated with wheat flour. When this is the case, it does not readily make a smooth paste with water, but exhibits considerable toughness, and somewhat of a stringy appearance. The common proportions employed by some grocers are,—dried common salt, wheat flour, and superfine mustard, equal parts, colored with turmeric, and sharpened with cayenne. Pure flour of mustard is used in medicine, to make poultices, &c.

MUSTARD for the table, (*ready made mustard,*) is prepared as follows:

1. (M. Soyés.) Steep mustard seed in twice its bulk of distilled vinegar for 8 days, then grind the whole to a paste in a mill; put it into pots, and thrust a red-hot poker into each of them. *Patented.*

2. (M. Lenormand.) Best flour of mustard 2 lbs.; fresh parsley, chervil, celery, and tarragon, of each ½ oz.; garlic, 1 clove; 12 salt anchovies; (all well chopped;) grind well together, add salt 1 oz.; grape juice or sugar to sweeten, and sufficient water to form the mass into a thinnish paste by trituration in a mortar. When put into pots, a red-hot poker must be thrust in as above, and afterwards a little vinegar poured upon the surface.

3. (*Moutarde à l'estragon.*) Black mustard seed dried till friable, and then finely powdered, 1 lb.; salt 2 oz.; tarragon vinegar to mix. In a similar way the French prepare several other mustards, by employing different vinegars.

4. (*Patent.*) Black ginger, bruised, 12 lbs.; common salt 18 lbs.; water 15 gallons; boil, strain, and add to each gallon, flour of mustard 5 lbs.

5. (*Moutarde superbe.*) Salt 1½ lb.; scraped horseradish 1 lb.; garlic 2 cloves; boiling vinegar 2 gallons; macerate in a covered vessel for 24 hours, strain, and add flour of mustard q. s.

6. To the last add a little soluble cayenne pepper, or essence of cayenne.

7. Mustard 3 lbs.; salt 1 lb.; vinegar, grape juice, or white wine to mix.

MYKOMELINIC ACID. A new acid discovered by Wöhler and Liebig, and obtained by heating to 212° a solution of alloxan with an excess of ammonia, adding dilute sulphuric acid, also in excess, and boiling for a few minutes. The new acid falls as a yellow gelatinous precipitate, which dries to a yellow porous powder.

MYRICINE. The portion of wax which is insoluble in alcohol.

MYRISTICINE. The stéaroptène deposited by oil of nutmegs by keeping.

MYRONIC ACID. Bussy has given this name to an inodorous, bitter, non-crystallizable acid found

by him in black mustard. It is soluble in water and alcohol.

MYROSYNE. *Syn.* EMULSION OF BLACK MUSTARD. A name given by Bussy to a peculiar substance soluble in water, and which possesses the power of converting myronic acid into the volatile oil of mustard.

MYROSPERMINE. The portion of the oil of balsam of Peru which is soluble in alcohol.

MYROXILINE. The portion of the oil of balsam of Peru insoluble in alcohol.

MYRRH. *Syn.* MYRRHA, (*Lat.*) The gum resin of balsamodendron myrrha. To ascertain the purity of myrrh, triturate a small quantity of the powder of the suspected myrrh with an equal amount of muriate of ammonia, adding water gradually; if the whole is readily dissolved, the myrrh is true; otherwise it is sophisticated with some other substance. (Giovanni Righini.)

MYRRHIC ACID. The hard resin of myrrh. It is soluble in the caustic alkalis, forming *alkaline myrrhates.*

NAILS (THE) should be kept clean by the daily use of the nail brush and soap and water. After wiping the hands, but while they are still soft from the action of the water, gently push back the skin which is apt to grow over the nails, which will not only preserve them neatly rounded, but will prevent the skin cracking around their roots, (*nail-springs,*) and becoming sore. The points of the nails should be pared at least once a week; biting them should be avoided.

NANKEEN DYE. *Prep.* Annotto and potash, equal parts; water q. s.; boil till dissolved. The proportion of potash is varied according to the shade required; the alkali darkens it. *Used* to dye nankeen color, but chiefly to restore the color of faded nankeen clothing.

NAPHTHA. *Syn.* MINERAL NAPHTHA. ROCK OIL. HUILE PETROLE, (*Fr.*) STEINÖL, (*Ger.*) NAPHTHA, (*Lat.*, from Ναφθα.) A limpid bitumen which exudes from the surface of the earth in various parts of the world. It possesses a penetrating odor and a yellow color, but may be rendered colorless by distillation; it boils at about 160°, and is very inflammable. Sp. gr. 0·753 to 0·836. It does not mix with water, but imparts to that fluid its peculiar taste and smell. It mixes with alcohol and oils, and dissolves sulphur, phosphorus, camphor, iodine, most of the resins, wax, fats, spermaceti, and forms with caoutchouc a gelatinous varnish. It is frequently adulterated with oil of turpentine, but this fraud may be detected by the addition of some oil of vitriol, which will in that case thicken and darken it. Naphtha is chiefly employed for the purposes of illumination, as a solvent for Indian rubber, and in the preparation of a very superior black pigment.

Remarks. According to the researches of Laurent, Pelletier, Walter, and others, mineral naphtha is a compound of several hydro-carbons, to which the names *paraffine, naphtha, naphthene, naphthole, &c.*, have been given. A similar fluid to mineral naphtha is obtained by the distillation of coal tar, (*coal naphtha,*) and is largely employed in the arts, in the preparation of coarse paints and varnishes, and for the solution of Indian rubber. The term has also been very improperly extended to the pyroxilic spirit of commerce, (*wood naphtha,*) and also occasionally to pyroacetic spirit; but these liquids differ from naphtha, both in their composition, odor, and boiling points, and in being miscible with water, and incapable of dissolving Indian rubber. The confusion arising from the above misapplication of names, may be readily imagined, when the reader is informed, that a certain physician who lately made himself conspicuous by the assertion that he had cured consumption with wood naphtha, and publicly stated that the kind he employed was *pure pyroacetic spirit,* was in reality dosing his patients with *commercial pyroxilic spirit,* which is quite a different article. Thus the doctor was using *one compound,* and from want of a practical knowledge of the matter, was directing the profession to use *another.*

NAPHTHALAMIDE. A compound obtained by the distillation of naphthalate of ammonia.

NAPHTHALIC ACID. A crystalline substance resembling benzoic acid, obtained by Laurent from naphthaline.

NAPHTHALINE. A white, crystallizable, odorous, volatile substance, obtained by redistilling coal tar. It melts at 180° F., is soluble in alcohol and ether, and forms with sulphuric acid *sulpho-naphthalic acid.*

NARCEIA. *Syn.* NARCEINA. NARCEINE. (From ναρκη, *stupor.*) A peculiar vegeto-alkaline base discovered by Pelletier in opium. It is obtained from the aqueous solution of opium, after it has been freed from morphia and narcotine by ammonia, and from the resulting meconate of ammonia by baryta. On boiling the filtered solution to expel the ammonia, and evaporating, crystals of narceia are gradually deposited. It may be purified by solution in hot alcohol and crystallization.

⁎ White acicular prisms, inodorous, bitter, pungent; soluble in 375 parts of water at 60°, and 230 parts at 212°; insoluble in ether; imperfectly neutralizes the acids. It is distinguished from morphia by its easier fusibility, (198°,) and by its salts in a certain degree of concentration being blue, but on gradual dilution changing to violet, and rose-red, and ultimately becoming colorless. It does not strike a blue color with sesquichloride of iron, like morphia, but forms a blue compound with starch. In opposition to its name, it appears to be nearly inert.

NARCOTIC. *Syn.* NARCOTICUS. (*Lat.*, from ναρκοω, *to stupify.*) A medicine that produces drowsiness, sleep, and stupor. In small doses, narcotics mostly act as stimulants, but in large ones they produce calmness of mind, torpor, and even coma and death. Opium, henbane, hemlock, tobacco, camphor, alcohol, ether, &c., are narcotics.

NARCOTINA. *Syn.* NARCOTINE. SEL D'OPIUM; MATIERE DE DEROSNE, (*Fr.*) (From ναρκωτικός, *narcotic.*) A peculiar crystalline substance found by Derosne in opium, and on which its stimulant property was at first supposed to depend. It may be easily obtained from opium exhausted of soluble matter by cold water, by treating it with water acidulated with acetic or hydrochloric acid, filtering, neutralizing with ammonia, and dissolving the washed precipitate in boiling alcohol, which will again deposite it as it cools. It may be fur-

ther purified by solution in ether. Narcotine may likewise be directly obtained by the action of ether on opium, previously exhausted by cold water. With the acids it forms salts. Narcotine is sparingly soluble in boiling water, but freely soluble in boiling alcohol, and in ether. It is distinguished from morphia by its insipidity, solubility in ether, insolubility in alkalis, and by giving an orange tint to nitric acid, and a greasy stain to paper, when heated on it over a candle. The physiological action of narcotine is differently stated by different authorities. 1 gr. dissolved in *olive oil*, killed a dog in 24 hours; but 24 grs. dissolved in *acetic acid* were given with impunity. (Majendie.) In the solid state it is inert; 129 grs. at a dose scarcely produce any obvious effects. (Bally.) Scruple doses have been given without injury. (Dr. Roots.) It has been recently proposed as a substitute for quinine in the cure of agues. For this purpose the sulphate is preferable. 200 cases of intermittent and remittent fevers have been thus successfully treated in India. (Dr. O'Shaughnessy.)

NECTAR. *Prep.* I. Chopped raisins 2 lbs.; loaf sugar 4 lbs; boiling water 2 gallons; mix; when cold, add 2 lemons, sliced; proof spirit (brandy or rum) 3 pints; macerate in a covered vessel for 4 or 5 days, occasionally shaking, strain, let it stand in a cold place for a week to clear, and then bottle. In ten days, or less, if kept in a very cold place, it will be excellent.

II. Red ratifia 3 gallons; oils of cassia and caraway, of each, 25 drops; previously dissolved in brandy ½ pint; orange wine 1 gallon; sliced oranges 6 in no.; lump sugar 2 lbs.; macerate for a week, decant and bottle. Both are used as pleasant cordials.

NEGUS. *Prep.* I. (*Red.*) Port wine 1 bottle, (1½ pints;) ½ nutmeg, grated; the juice of two lemons, and the yellow peel of one; lump sugar ½ lb.; put the whole into a bottle, add boiling water 3 pints, cork down close, and macerate with agitation. *** Very excellent. The addition of a single drop of essence of ambergris, and 6 or 7 drops of essence of vanilla, improves it.

II. (*White.*) From white wine, as the last. *** A single glass of the above may be made by observing the same proportions.

NERVOUSNESS. The cure of nervousness is best effected by restoring the healthy action of the stomach and bowels, and by the use of proper exercise, especially in the open air. The stomach should not be overloaded with indigestible food, and the bowels should be occasionally relieved by the use of some mild aperient. Abernethy's injunction to a nervous and dyspeptic lady, "*Dismiss your servants, madam, and make your own beds*," should be recollected by all as a proof of the importance that eminent surgeon attached to EXERCISE. (See DYSPEPSIA, FLATULENCY, HYPOCHONDRIASIS, HYSTERICS, &c.)

NEUTRALIZATION. *Syn* NEUTRALISATIO, (*Lat.*) The admixture of an acid and alkali in such proportions that neither shall predominate. A neutral compound neither turns turmeric paper *brown*, nor litmus paper *red*.

NICKEL. A white, hard, malleable metal, capable of receiving the lustre of silver. Its sp. gr. when hammered is about 8·82. It is chiefly employed in the manufacture of German silver.

Prep. Roast powdered *speise* first by itself and then with charcoal powder, till all the arsenic is expelled, and a garlic odor ceases to be evolved; mix the residuum with 3 parts of sulphur and 1 part of potash, melt in a crucible with a gentle heat, cool, edulcorate with water, dissolve in sulphuric acid mixed with a little nitric acid, precipitate with carbonate of potash, wash, dry, mix the precipitate with powdered charcoal, and reduce it by heat. For chemical purposes pure nickel is best obtained by moderately heating its oxalate in a covered crucible.

Props., &c. Nickel is very infusible. Muriatic and sulphuric acid act on it with difficulty unless mixed with nitric acid. It is freely soluble in the latter menstruum. With oxygen it forms two oxides. The *protoxide* (gray oxide) may be obtained by heating the nitrate, carbonate, or oxalate to redness in open vessels. This oxide forms salts with the acids, most of which have a green color. The *peroxide* (black oxide) is formed when chlorine is transmitted through water holding the hydrated protoxide in suspension. *Chloride of nickel* is formed by the direct solution of the metal or its oxide in muriatic acid, from which it may be obtained in green crystals by evaporation. The *salts of nickel* are characterized by being precipitated *white* by prussiate of potash; *grayish white* by infusion of galls; *black* by hydrosulphurets and sulphureted hydrogen; *pale green* by pure alkalis and alkaline carbonates, but redissolved by ammonia or its carbonate in excess.

NICOTINE. *Syn.* NICOTINA. A volatile base discovered by Reiman and Posselt in tobacco.

Prep. (Ortigosa.) Infuse tobacco leaves for 24 hours in water acidulated with sulphuric acid, strain, evaporate to a sirup, add one-sixth of its volume of strong solution of potassa, and distil in an oil bath at 288°, occasionally adding a little water to assist the process. Saturate the distilled product with oxalic acid, evaporate to dryness, digest in boiling absolute alcohol, evaporate to a sirup, decompose the oxalate of nicotine thus obtained, by adding caustic potassa to it in a close vessel, and agitate the mass with ether, repeating the process with more ether till all the nicotine is dissolved out. Distil the mixed ethereal solutions in a water-bath. At first ether comes over, then water, and lastly nicotine, which towards the end of the process assumes a yellowish tint.

Remarks. Nicotine is a colorless volatile liquid, smelling of tobacco, boiling at 375°, soluble in water, ether, alcohol, and oils, and combining with the acids forming salts, many of which are crystallizable. It is a frightful poison; ¼th of a drop will kill a rabbit, and a single drop a large dog. Good Virginia tobacco yields 1⅞ of nicotine. (Thomson, Org. Chem.)

NIGELLIN. A yellowish liquid obtained by Rensch from the seeds of the *nigella sativa*. It is obtained by digestion in alcohol at 80°, distilling the tincture, separating the reddish brown from the lighter portion of the product, agitating the latter with ether, and then with water, adding to the liquid when decanted, a little subacetate of lead, filtering and treating it with sulphureted hydrogen. The aqueous liquid is then filtered and evaporated.

NIGHTMARE *Syn.* EPHIALTES, (*Lat.*, from

ἐφάλλομαι, *to leap upon;* because it was thought a demon leaped upon the chest.) The prevention of nightmare consists in the selection of proper food, and in duly attending to the state of the stomach and bowels. Heavy and late suppers should be particularly avoided, as well as all articles of diet that are of difficult digestion, or apt to induce flatulency. A spoonful of spirits of sal volatile, magnesia, or bicarbonate of soda, taken in a glass of cold water on going to bed, is a good and simple preventive.

NIPPLES, SORE. *Prep.* Moisten them 2 or 3 times a day for some weeks before suckling, with brandy or spirit, gently acidulated with dilute sulphuric acid; or instead thereof employ tincture of balsam of tolu, or compound tincture of benzoin.

Cure. Chapped nipples are most quickly and safely cured by moistening them 2 or 3 times a day with tincture of catechu, by means of a camel hair pencil. *** All applications of an active or poisonous nature should be carefully avoided, as even though the part be washed, yet a portion will still remain concealed within the pores of the skin and be sucked off by the infant.

NITRATE. *Syn.* NITRAS, (*Lat.*) A salt of nitric acid. The nitrates are very easily made by the direct solution of the base, or its oxide or carbonate in nitric acid, which in most cases should be previously diluted with water; by evaporation they may be obtained either in the pulverulent or crystalline state. The nitrates are characterized by deflagrating when thrown on red-hot coal, or when heated in contact with inflammable substances. (See NITRIC ACID.)

NITRATE OF CAMPHOR. *Syn.* OIL OF CAMPHOR. Prepared by dissolving camphor in nitric acid.

NITRATE OF POTASH. *Syn.* SALTPETRE. NITRE. NITRUM. SAL PETRÆ. SAL NITRI. KALI NITRATUM. POTASSÆ NITRAS, (P. L. E. and D.) NITRATE DE POTASSE, (*Fr.*) SALPETERSÄURES KALI, (*Ger.*) This salt is spontaneously generated in the soil, owing to the action of the atmosphere, and crystallizes upon its surface in various parts of the world, especially in the East Indies. It is also produced artificially by exposing a mixture of calcareous soil and animal matter to the atmosphere, when nitrate of lime is slowly formed, and is extracted by lixiviation. The liquid is then decomposed by adding carbonate of potash, by which carbonate of lime is precipitated and nitrate of potash remains in solution. The British market is wholly supplied from India. The crude nitre (*rough saltpetre*) is extracted by lixiviation in the way above mentioned, but the alkaline base is supplied under the form of wood ashes, which, as is well known, contain a large quantity of potash. It is purified by solution in boiling water, skimming, and after a short time being allowed for defecation, straining (while still hot) into crystallizing vessels. The crystals thus obtained are commonly called *single refined nitre;* and when the process is repeated, *double refined nitre.*

Use, &c. Nitre is chiefly employed in the manufacture of gunpowder and nitric acid. It is also used in medicine as a refrigerant, diaphoretic, and cooling diuretic. *Dose.* 5 to 15 grains, every 2 hours. A small piece dissolved slowly in the mouth, frequently stops a sore throat at the commencement. In large doses, it is poisonous. The best antidotal treatment is a powerful emetic, followed by opiates.

Pur. The Dublin College orders purified nitrate of potash (*potassæ nitras purificata*) to be made by dissolving nitre in twice its weight of hot water, filtering, and setting the liquor aside that crystals may form. Nitre occasionally contains muriates, sulphates, or calcareous salts. The *first* may be detected by its solution giving a cloudy white precipitate with nitrate of silver,—the *second*, by the muriate or nitrate of baryta or lime giving a white precipitate,—and the *third*, by oxalate of ammonia, which also gives a white precipitate.

NITRATE OF SODA. *Syn.* CUBIC NITRE. SODÆ NITRAS. This salt is obtained in a similar way to the last, and is chiefly imported into England from America. It is largely employed as a manure, and in the preparation of nitric acid.

NITRIC ACID. *Syn.* SOLUTIVE WATER. AQUAFORTIS. SPIRIT OF NITRE. ACIDUM NITRICUM, (P. L. E. & D.) ACIDE NITRIQUE, (*Fr.*) SALPETERSÄURE, (*Ger.*) An acid compound of nitrogen and oxygen. Nitric acid was known to Geber in the 7th century, but its constituents were first shown by Cavendish in 1785, and subsequently their proportions by Davy and Gay-Lussac.

Prep. (P. L. & E.) Dry purified nitrate of potash and sulphuric acid, equal parts; mix in a glass retort, and distil with a moderate heat into a cool receiver, so long as the fused materials continue to evolve vapor. "The pale-yellow acid thus obtained may be rendered colorless, should it be thought necessary, by heating it gently in a retort." (P. E)

Remarks. On the large scale nitric acid is commonly made by distilling a mixture of 168 lbs. of nitre and 93 lbs. of sulphuric acid, sp. gr. 1·845, in an iron cylinder, connected with a series of 5 or 6 double-necked stoneware bottles, about one-sixth part filled with water. The arrangement of the apparatus resembles that figured at page 57. The product of this process is the brown and fuming *nitrous acid* of commerce, (*aquafortis, fuming nitric acid; acidum nitrosum; acidum nitricum fumans,*) and has usually the sp. gr. 1·45. It is converted into colorless nitric acid by gently heating it in a glass retort, when it forms commercial nitric acid, (sp. gr. 1·37 to 1·4.) The residuum of this process (*sal enixum*) is employed as a flux by the glass-houses, and in the manufacture of alum. Nitrate of soda is frequently used instead of nitrate of potash, and is more convenient in some respects, as the residuum is more easily dissolved out of the retort or cylinder. The formula of the London or Edinburgh Pharmacopœia is the best process for obtaining a pure acid. By proper management nitre yields more than two-thirds of its weight of pure nitric acid, sp. gr. 1·500; and nitrate of soda its own weight of acid, sp. gr. 1·4.

The nitric acid of commerce frequently contains chlorine, muriatic and sulphuric acids, and sometimes iodine, from which it may be purified by the addition of a little nitrate of silver, as long as it produces any cloudiness, and after repose, decanting the clear acid, and rectifying it at a heat under 212°. A perfectly colorless product cannot be

obtained, unless a small portion of pure black oxide of manganese be put into the retort. (Murray.) Nitric acid may also be purified by rectification at a gentle heat, rejecting the first liquid that comes over, receiving the middle portion as genuine acid, and leaving a residuum in the retort. (Ure.) Another method is to agitate it with a little red-lead before rectification.

Props. Pure nitric acid is a colorless, corrosive liquid, and possesses powerful acid properties. At the sp. gr. 1·50, it contains 25% of water, (Phillips; —20·3%, Ure.) The sp. gr. of the strongest liquid acid is variously stated by different authorities. According to some, it may be obtained as high as 1·55, (Davy, Kirwin, &c.,) or 1·62, (Proust;) while, according to others, 1·503 to 1·510 is the greatest density at which it can be procured. (Phillips, Gay-Lussac, &c.) At 248° F. it boils, and when of less density than 1·42, parts with water and becomes stronger at lower temperatures; but acid of higher sp. gr. is weakened by exposure to heat. It freezes when exposed to extreme cold. It rapidly oxidizes the metals, and unites with them and the other bases, forming salts called NITRATES.

Uses. Nitric acid is employed in assaying, to dye silk and woollens yellow, and to form various salts. In medicine, it is used as a caustic to corns and warts; and in doses of 1 to 10 drops in a tumbler of water, in liver complaints, fevers, dyspepsia, syphilis, to remove the effects of mercury, or as a substitute for that drug in certain complaints, &c.

Pur. Pure nitric acid is "totally dissipated by heat. When diluted with distilled water, neither nitrate of silver, nor chloride of barium, (or calcium,) produces a precipitate; sp. gr. 1·50. 100 grs. of this acid will saturate about 217 grs. of crystallized carbonate of soda." (P. L.) The *double aquafortis* of the shops (AQUAFORTIS DUPLEX) has usually the sp. gr. 1·36; and the *single aquafortis*, (AQUAFORTIS SIMPLEX,) the sp. gr. 1·22.

Tests. 1. It stains the skin yellow. 2. When mixed with a little muriatic acid or sal ammoniac, it acquires the power of dissolving gold leaf. 3. When mixed with dilute sulphuric acid, and poured on a few fragments of zinc or iron in a tube, the evolved gas burns with a greenish white flame. (Balmain.) 4. Substitute alcohol for zinc in the last test. (Maitland.) 5. Morphia, brucia, and strychnia give it a red color, which is heightened by ammonia in excess. 6. When placed in a tube, and a solution of protosulphate of iron cautiously added, a dark color is developed at the line of junction, which is distinctly visible when only $\frac{1}{24000}$ part of nitric acid is present. (Derbanius de Richemont.) 7. When mixed with a weak solution of sulphate of indigo, and heated, the color is destroyed. 8. When saturated with carbonate of potash or soda, and evaporated to dryness, the residuum deflagrates when thrown on burning coals. 9. The NITRATES may all be tested as above, by first adding a small quantity of pure sulphuric acid, which will liberate the nitric acid of the salt.

Estim. The strength of nitric acid is usually estimated by its sp. gr.; but where very great accuracy is required, it may be more correctly ascertained by the amount of carbonate of soda, or other salt of known composition, which is required to neutralize it. See ACIDIMETRY.

TABLE of NITRIC ACID, by DR. URE.

Specific Gravity.	Liq. Acid in 100.	Dry Acid in 100.	Specific Gravity.	Liq. Acid in 100.	Dry Acid in 100.	Specific Gravity.	Liq. Acid in 100.	Dry Acid in 100.	Specific Gravity.	Liq. Acid in 100.	Dry Acid in 100.
1.5000	100	79.700	1.4189	75	59.755	1.2947	50	39.850	1.1403	25	19.925
1.4980	99	78.903	1.4147	74	58.978	1.2887	49	39.053	1.1345	24	19.128
1.4960	98	78.106	1.4107	73	58.181	1.2826	48	38.256	1.1286	23	18.331
1.4940	97	77.309	1.4065	72	57.384	1.2765	47	37.459	1.1227	22	17.534
1.4910	96	76.512	1.4023	71	56.587	1.2705	46	36.662	1.1168	21	16.737
1.4880	95	75.715	1.3978	70	55.790	1.2644	45	35.865	1.1109	20	15.940
1.4850	94	74.918	1.3945	69	54.993	1.2583	44	35.068	1.1051	19	15.143
1.4820	93	74.121	1.3882	68	54.196	1.2523	43	34.271	1.0993	18	14.346
1.4790	92	73.324	1.3833	67	53.399	1.2462	42	33.474	1.0935	17	13.549
1.4760	91	72.527	1.3783	66	52.602	1.2402	41	32.677	1.0878	16	12.752
1.4730	90	71.730	1.3732	65	51.805	1.2341	40	31.880	1.0821	15	11.955
1.4700	89	70.933	1.3681	64	51.068	1.2277	39	31.083	1.0764	14	11.158
1.4670	88	70.136	1.3630	63	50.211	1.2212	38	30.286	1.0708	13	10.361
1.4640	87	69.339	1.3579	62	49.414	1.2148	37	29.489	1.0651	12	9.564
1.4600	86	68.542	1.3529	61	48.617	1.2084	36	28.692	1.0595	11	8.767
1.4570	85	67.745	1.3477	60	47.820	1.2019	35	27.895	1.0540	10	7.970
1.4530	84	66.948	1.3427	59	47.023	1.1958	34	27.098	1.0485	9	7.173
1.4500	83	66.155	1.3376	58	46.226	1.1895	33	26.301	1.0430	8	6.376
1.4460	82	65.354	1.3323	57	45.429	1.1833	32	25.504	1.0375	7	5.579
1.4424	81	64.557	1.3270	56	44.632	1.1770	31	24.707	1.0320	6	4.782
1.4385	80	63.760	1.3216	55	43.835	1.1709	30	23.900	1.0267	5	3.985
1.4346	79	62.963	1.3163	54	43.038	1.1648	29	23.113	1.0212	4	3.188
1.4306	78	62.166	1.3110	53	42.241	1.1587	28	22.316	1.0159	3	2.391
1.4269	77	61.369	1.3056	52	41.444	1.1526	27	21.519	1.0106	2	1.594
1.4228	76	60.572	1.3001	51	40.647	1.1465	26	20.722	1.0053	1	0.797

NITRIC ACID, (DILUTED.) *Syn.* ACIDUM NITRICUM DILUTUM, (P. L.) *Prep.* Nitric acid (P. L.) f ℥j; water f ℥ix; mix. Kept for convenience in dispensing. *Dose.* 20 drops to f ʒij.

NITRIC ACID, (HENRY'S.) Nitric acid diluted to the sp. gr. 1·143; equal in saturating power to muriatic acid at 1·074, and sulphuric acid 1·135. *Used* for assaying. See HENRY'S MURIATIC ACID.

NITRO-MÉCONIC ACID is formed by the action of strong nitric acid on meconine at a gentle heat. By solution in hot water, it is obtained in yellow crystals as the liquid cools.

NITROGEN. *Syn.* AZOTE, (*Fr.* and *Eng.*) MEPHITIC AIR. PHLOGISTICATED DO. STICKSTOFF-GAS, (*Ger.*) NITROGENIUM; AZOTUM, (*Lat.*, the first from *νίτρον*, *nitre*, and *γεννάω*, *I generate*; th

second from *a* privative, and ζωὴ, *life.*) A gaseous substance discovered by Rutherford in 1772, and found to be a constituent of the atmosphere by Lavoisier and Scheele in 1775. It has hitherto resisted all attempts at decomposition, and must therefore be considered as a chemical element. (See Chem. V. 3.) It is found both in the organic and inorganic kingdoms; it forms about 79% of the bulk of the atmosphere, and enters largely into the composition of most animal substances, and is a constituent of gluten, the alkaloids, and other vegetable principles.

Prep. I. Burn phosphorus in a jar filled with air, and standing over water in the pneumatic trough, and after the fumes have subsided, agitate the residual gas with water, or a solution of pure potassa.

II. Expose nitrite of ammonia to heat in a retort, and collect the evolved gas.

III. Transmit chlorine through pure ammonia water.

IV. Digest lean flesh in nitric acid, gently heated.

Remarks. Pure nitrogen is a colorless, odorless, tasteless gas, neither combustible nor capable of supporting combustion or respiration. It is neutral to test paper, does not affect lime water, and is only slightly absorbed by pure water. Its sp. gr. is 0·9722, (Liebig; 0·976 Berzelius.) In analysis it is recognised by its purely negative qualities, and by its forming nitric acid when mixed with oxygen, and exposed to the electric spark; or when a jet of hydrogen is burnt in the mixed gases. The nitric acid thus formed may be tested in the way described under that article.

NITROGEN, CHLORIDE OF. *Syn.* QUADROCHLORIDE OF NITROGEN. A compound of nitrogen and chlorine, remarkable for the feeble affinity by which its elements are united. It was discovered by Dulong in 1811, but its nature was first accurately determined by Sir H. Davy.

Prep. Dissolve muriate of ammonia 1 oz. in hot water 12 or 14 oz., and as soon as the temperature has fallen to 90° F., invert a wide-mouthed glass bottle full of chlorine over it. The gas is gradually absorbed, and the solution acquires a yellow color, and in the course of 15 to 20 minutes, yellow oil-like globules form upon the surface of the liquid, and ultimately sink to the bottom. The globules as they descend should be received in a small leaden saucer, placed under the mouth of the bottle for the purpose. (Liebig.)

Remarks. Chloride of azote is one of the most explosive compounds known, and should consequently be only prepared in *very small* quantities at a time. Both its discoverer and Sir H. Davy met with severe injuries while experimenting on it. Its sp. gr. is 1·653; it volatilizes at 160° F., and at 200° explodes violently. Contact with combustible bodies at ordinary temperatures immediately causes detonation. The explosive power of this compound seems to exceed that of every known substance, not even excepting fulminating silver. A minute globule no larger than a grain of mustard-seed, placed on a platina spoon, and touched with a piece of phosphorus stuck on the point of a penknife, immediately explodes, and shivers the blade into fragments, at the same time that the vessel that contained it is broken to pieces. Olive oil, naphtha, and oil of turpentine, have a similar effect. It has been suggested that this compound is the substance employed by Captain Warner in his destructive machines, but such a supposition must necessarily be incorrect, from the uncontrollable nature of the chloride, and the impracticability of *safely* procuring it in sufficient quantity by any known process. I conceive that Captain Warner employs fulminating antimony, either alone, or as an instrument for the ignition of common gunpowder. At all events, if this is not the Captain's secret, it is capable of producing exactly the same effects. (See IODIDE OF NITROGEN, for another dangerous explosive compound.)

NITROGEN, OXIDES OF. *Prep.* I. (*Nitrous oxide. Protoxide of nitrogen. Dephlogisticated nitrous air. Laughing gas. Protoxide d'azote,* Fr. *Stickstoffoxydul,* Ger.) Evaporate a solution of nitrate of ammonia until a drop of the fused mass placed on a cold plate instantly solidifies; cool, break the lump into pieces, and place it in a stoppered bottle. For use, a portion is introduced into a glass retort, and heat applied by means of a spirit lamp or charcoal chauffer. As soon as the heat reaches 480°, protoxide of azote is evolved, and may be collected in bladders, gas bags, a gasometer, or in the pneumatic trough. *** Should white fumes appear within the retort after the evolution of the gas has commenced, the heat should be lowered, as when heated to about 600°, nitrate of ammonia explodes with violence. Nitrous oxide may also be made in the same way from crystallized nitrate of ammonia, or by exposing nitric oxide for some days over iron filings.

Remarks. The above compound, familiarly known as *laughing gas,* is colorless, possesses an agreeable odor, and a sweetish taste. At 45°, and under a pressure of 50 atmospheres, it is liquid. Its sp. gr. is 1·5241, it supports combustion, and is absorbed by water. Its most remarkable property is its action on the system when inspired. A few deep inspirations are usually succeeded by a pleasing state of excitement, and a strong propensity to laughter and muscular exertion, which soon subside, without being followed by languor or depression. Its effects, however, vary with different constitutions. A sailor that lately took this gas at a public exhibition immediately drew his knife, and stabbed one of the company. From 4 to 12 quarts may be breathed with safety.

II. (*Binoxide of nitrogen. Deutoxide of do. Nitric oxide. Nitrous gas. Deutoxide d'azote,* Fr. *Stickstoffoxyd,* Ger.) This is most conveniently prepared by pouring nitric acid, sp. gr. 1·2, on metallic copper. Effervescence ensues, and nitrous gas is evolved, and may be collected over water or mercury in the pneumatic trough. The residual liquid yields crystals of nitrate of copper on evaporation.

Remarks. A colorless, tasteless, inodorous, irrespirable, and incombustible gas. In contact with free oxygen, it produces dense orange or red vapors of nitrous acid, which are freely absorbed by water. Its sp. gr. is about 1·04.

NITROGEN, PHOSPHORET. A snow-white powder formed by heating chloride of phosphorus, previously saturated with dry ammoniacal gas. (Rose.)

NITROGEN, SULPHURET. A greenish yellow mass, obtained by the action of water on a compound of chloride of sulphur and ammonia. (Soubeiran.)

NITROMURIATIC ACID. *Syn.* NITROHYDROCHLORIC ACID. AQUA REGIA. ACIDUM NITROMURIATICUM, (P. D.) EAU REGALE; ACIDE NITROMURIATIQUE, (*Fr.*) SALPETER-SALZSÄURES; KÖNIGSWASSER, (*Ger.*) *Prep.* I. Nitric acid f℥j; muriatic acid f℥ij; mix. Used to dissolve gold and platinum, and in medicine, in liver complaints, syphilis, exanthemata, &c., either *internally*, in doses of 5 to 15 drops in water, or *externally*, as a foot or knee-bath. See BATH.

II. (*Aqua regia with sal ammoniac.*) Nitric acid (sp. gr. 1·2) f℥xvj; sal ammoniac ℥iv; dissolve. Occasionally used by dyers; does not keep well. Nitre is sometimes substituted for sal ammoniac. Dissolves gold and platina.

III. (*Dyer's aquafortis.*) Colorless nitric acid (sp. gr. 1·17) 100 lbs.; muriatic acid (sp. gr. 1·19) 5 lbs.; mix. *Used* by dyers. "It dissolves tin without oxidizing it." (?)

NITROUS ACID. *Syn.* ACIDUM NITROSUM, (*Lat.*) ACIDE NITREUX, (*Fr.*) SALPETRIGE SALPETERSÄURE, (*Ger.*) *Prep.* Distil perfectly dry nitrate of lead in a coated glass retort, connected with a glass receiver placed in a freezing mixture, and furnished with a safety tube. A pungent, acid, corrosive liquid, colorless below zero, but yellow, or orange-colored at higher temperatures; sp. gr. 1·42; boiling point 82° F. It is a powerful oxidizing agent. When mixed with water, it is decomposed. A mixture of nitrous and nitric acids forms the fuming nitric acid (aquafortis) of commerce. Its compounds with the bases are called NITRITES. *Nitrite of potassa* may be obtained by heating nitre to redness, and removing it from the fire before the decomposition is complete. Both nitrous and hyponitrous acids contain no water, and are therefore *dry* liquids. (Ure.)

NITROSALICULIC ACID. Small golden-colored crystals, obtained by gently heating saliculous acid with moderately strong nitric acid, washing the mass with water, dissolving in alcohol, and crystallizing. It forms crystallizable *nitrosaliculates* with the alkalis.

NITROSACCHARIC ACID. A peculiar crystallized acid, formed by the union of nitric acid with the saccharine matter obtained by the action of sulphuric acid on gelatin.

NORFOLK FLUID. *Prep.* Linseed oil 3 pints; yellow rosin 4 oz.; fir rosin 2 oz.; yellow wax 12 oz.; melt, add neat's foot oil 1 quart; oil of turpentine 1 pint. *Used* to preserve and soften leather.

NOVARGENT. Freshly-precipitated muriate of silver dissolved in a solution of hydrosulphite of soda. *Used* to silver metals, especially to restore old plated goods.

NOVAURUM. A solution of neutral terchloride of gold. (See GOLD, LIQUID.)

NOYEAU. *Syn.* CREME DE NOYEAU, (*Fr.*) *Prep.* I. Blanched bitter almonds 1 oz.; proof spirit 1 quart; lump sugar 1 lb.; dissolved in water ½ pint; digest and filter.

II. Bitter almonds, blanched, 3 oz.; coriander seed ¼ oz.; cinnamon, ginger, and mace, of each, 1 dr.; proof spirit or plain gin 2 quarts; white sugar 2 lbs.; dissolved in water 1½ pints; macerate for a week, and fine down with alum (dissolved) ¼ oz.

III. (*Crême de noyeau de Martinique.*) Loaf sugar 24 lbs.; water 2½ gallons; dissolve, add proof spirit 5 gallons; or orange-flower water 3 pints; bitter almonds 1 lb.; essence of lemons 2 dr.; as above. A pleasant nutty-tasted liqueur, but should not be taken in large quantities. (See CORDIALS.)

OATS. A large portion of the oats given to horses passes off undigested. It has been proposed to prevent this loss, by either coarsely bruising them in a mill, or by pouring boiling water over them, and allowing them to macerate till cold, when they are to be given to the horses without straining off the water. It is stated on good authority, that oats thus treated will not only fatten quicker, but go twice as far as without preparation.

ODORS. (See DISINFECTANTS and FUMIGATION.)

ŒNANTHIC ACID. This acid passes over, in small quantity, towards the end of the process when wine is distilled. By digestion with potash and decomposition with sulphuric acid, it may be obtained under the form of an oily liquid. (See ETHER, ŒNANTHIC.)

ŒNANTHYLIC ACID. A peculiar substance obtained by Mr. Tilley, by the action of nitric acid on castor oil.

ŒNOTHIONIC ACID. (From οινος, *wine*, and θειον, *sulphur*.) Sulphovinic acid.

OIL COLOR CAKES. *Prep.* Grind the colors with oil of turpentine, in which has been dissolved in the cold, about one-sixth of its weight of powdered mastich; let them dry, then place the stone over a slow charcoal fire, so as to soften the color, and add of a warm solution of spermaceti in half its weight of poppy oil, q. s. to make the mass into a proper paste; remove the heat, work till it begins to harden, then form the mass into pieces and mould them into cakes. *Used* by artists, rubbed down with poppy, nut, or linseed oil, and turpentine as required.

OIL COLORS, (*in bottles or bladders.*) Prepared with the same mixture as the last, but thinned sufficiently with any pale drying oil before putting them into the cases. *Used* by artists.

OIL GAS. A mixture of several gaseous hydrocarbons obtained by passing oil through red hot tubes, or dropping it on red hot stones or bricks 1 gallon of whale oil yields 90 to 100 cubical feet of gas, which gives a more brilliant light than coal gas, and burns about 3 times as long.

OILS. *Syn.* HUILES, (*Fr.*) OELE, (*Ger.*) OLEA, (*Lat.*, from *olea*, the olive.) Oils are compounds of carbon and hydrogen, (hydrocarbons,) or of carbon, hydrogen, and oxygen, (oxyhydrocarbons,) derived from the animal and vegetable kingdoms, and chiefly distinguished by a certain degree of consistence, (unctuosity,) insolubility in water, and power of supporting combustion with flame. Oils are divided into two great classes; viz.: *fixed or fat oils*, and *volatile or essential oils*. Olive, rape, almond, and castor oils, are examples of the *former;* and the oils of lavender,

-mons, bergamotte, and turpentine, of the *latter*. The term *oil* is also applied to various *empyreumatic products* of the distillation of organic bodies, and to several unctuous mixtures in perfumery and pharmacy, as well as by liqueuristes to their richer cordials.

OILS, CORDIAL. (*In the art of the liqueuriste.*) Dilute aromatized alcohol, holding in solution a sufficient quantity of sugar to impart an oily consistence. The following is an example of this class of liqueurs:—

OIL OF CEDRAT. (*Crême de Cédrat.*) Spirit of cedrat 1 quart; spirit of citron 1 pint; proof spirit pints; lump sugar 5 lbs.; dissolved in water 6 pints; mix, allow it to stand together for a week, then filter if required. (See CORDIALS, CREMES, LIQUEURS, &c.)

OILS, COMPOUND. *Syn.* MIXED OILS. This term is commonly applied to various mixtures of oils or other ingredients that possess an unctuous appearance. Where not otherwise directed, they are prepared by simply agitating the ingredients together, and after a sufficient time decanting the clear, and filtering if necessary. The following are some of the principal *compound* oils:—

OIL, ACOUSTIC. (*Oleum terebinthinæ acousticum.* Mr. Maule.) Almond oil ʒiv; oil of turpentine ℈ij; mix. *Used* for deafness.

OIL, BLACK. Oil of turpentine 4 lbs.; rape oil gallon; oil of vitriol ½ lb.; British oil ¼ lb.; mix well, and in 14 days decant the clear.

OIL, BRITISH. (*Common oil of petre. Ol. petræ vulgare.*) Oil of turpentine 2 lbs.; Barbadoes tar 1 lb.; oil of rosemary 2 oz.; mix well.

OIL OF CAMPHOR. (*Ol. camphoræ nitricum,* Fee.) Nitric acid 460 grs.; camphor 200 grs.; dissolve without heat and decant the oil.

OIL, CAMPHORATED. (*Camphor liniment, linimentum camphoræ,* P. L. and E. *Ol. camphoratum,* P. D.) Camphor ℥j; olive oil ℥iv; dissolve by a gentle heat. Anodyne; discutient; used for sprains, bruises, &c.

OIL, CHABERT'S. Oil of turpentine 3 parts; Dippel's oil 1 part; mix and distil 3 parts. Used in tapeworm.

OIL, DARBY'S. Oil of amber, balsam of sulphur, and Barbadoes tar, equal parts.

OIL, EXETER. (*Ol. excestrense.*) Green oil 2 gallons; euphorbium, mustard seed, castor, and pellitory, of each bruised, ℥j; macerate with occasional agitation for 10 days, and strain.

OIL, FURNITURE. (*Oil stain. Mahogany do.*) Linseed oil 1 gallon; black rosin 1 lb.; alkanet root 12 oz., or less; heat together until sufficiently colored. Some persons use *boiled oil,* and others add a little *beeswax,* and *rose pink.*

OIL, MACASSAR. Olive oil 1 lb.; oils of origanum and rosemary, of each, 1 dr.; mix. *Used* to make the hair grow and curl.

OILS, MIXED. (*Ol. mixta.*) Essences of bergamotte and lemons, of each, ℥j; oils of lavender and pimento, of each, ℥ss; used to scent sal volatile drops, smelling bottles, &c.

OIL, NEAT'S FOOT. (*Nerve oil. Trotter's do. Ol. nervinum. Auxungia pedum tauri.*) From neat's feet and tripe by boiling; does not harden by age; used to soften leather and to fry fritters.

OIL, NEWMARKET. Oils of linseed, turpentine, and St. John's wort, of each, 3 lbs.; oil of vitriol 1 oz.; mix. For sprains in horses.

OILS, NINE. (*Mixed oils. Ol. ex omnibus.*) Train oil 1 gallon; oil of turpentine 1 quart; oil of bricks and amber, of each, 5 oz.; camphorated spirit of wine 10 oz.; Barbadoes tar 2½ lbs.; oil of vitriol 1 oz.; mix. *Used* by farriers.

OIL, PHOSPHORATED. (*Ol. phosphoratum.*)—1. (Ph. Bor.) Phosphorus 12 grs.; almond oil ℥j; dissolve by a gentle heat. *Dose.* 5 to 10 drops made into an emulsion.—2. (Majendie.) Phosphorus ʒj; almond oil ℥ij; macerate in the dark for 14 days, and scent with bergamotte. Stronger than the former. *** A bottle partly filled with oil saturated with phosphorus, will emit enough light in the dark, on the cork being taken out, to see the time by a watch.

OIL FOR QUITTERS. Aquafortis 1 oz.; spirit of wine, and oil of turpentine, of each, 3 oz.; red precipitate ½ oz.; mix. *Used* by farriers.

OIL OF ROSES. 1. Olive oil 1 pint; otto of roses ½ to 1 dr.; mix.—2. To the last add oil of rosemary ½ dr. Either may be colored red by steeping a little alkanet root in the oil (with heat) before scenting it. Used for the hair.

OIL, SHAVING. Soft soap 6 lbs.; rectified spirit of wine 1 gallon.

OIL, SHELDRAKE'S. Nut oil 1 pint; ceruse 2 oz.; boil; when dissolved, add copal varnish 1 pint, and stir till the oil of turpentine has evaporated. Used to grind colors in, to brighten them.

OIL OF SPIKE. (*Factitious.*) 1. Oil of turpentine 3 pints; oil of lavender 1 pint; mix. Used by enamellers to mix their colors in.—2. Oil of turpentine 1 gallon; Barbadoes tar 4 oz.; alkanet root 2 oz.; digest a week. Used as a liniment for horses.

OIL, SULPHURATED. (*Ol. Sulphuratum.*) (See BALSAM OF SULPHUR.)

OIL, TOOTHACHE. (*Toothache Drops.*) 1. Oils of origanum and cloves, of each fʒiij; camphor ʒj; dissolve.—2. To the last add creosote ʒj.—3. Tinctures of pellitory of Spain and colchicum, of each ℥j; creosote and oil of cloves, of each ʒj; mix. Dropped on a piece of lint and stuffed in the tooth, previously wetted with the drops by a camel-hair pencil.

OIL, WEDEL'S. (*Ol. Bezoardicum.*) Almond oil ℥ij; camphor ʒij; essence of bergamot ʒss; alkanet root to color; mix.

OIL, WORM. (*Ol. Vermifugum.*)—1. (Chabert.) Rectified oil of turpentine ʒiv; do. animal oil ʒj; mix. To be followed by a purgative.—2. (*For dogs.*) Turpentine 3 to 4 dr.; castor oil 1 oz.; for 1 dose.

OIL, WATCHMAKER'S. Prepared by placing a clean strip of lead in a small white glass bottle filled with olive oil, and exposing it to the sun's rays at a window for some time, till a curdy matter ceases to deposite, and the oil has become quite limpid and colorless. Used for fine work; does not get thick by age. (See OLEIN.)

OILS, EMPYREUMATIC. Oily fluids obtained by the dry distillation of various animal and vegetable substances. If the ingredients are of a liquid or pasty nature, or become so when heated, they are usually mixed with about twice their weight of sand, to divide them, and thus expose

them more effectually to the action of the fire. They are purified by rectification, either alone or along with water. The following are the principal *empyreumatic oils* :—

ANIMAL OIL. (*Empyreumatic animal oil. Dippel's do. Ol. Animale. Rectified oil of hartshorn. O. Dippelii. O. cornu cervi Rectificatum.*) Chiefly obtained as a secondary product in the manufacture of boneblack; fetid black. A finer kind is made by slowly distilling oil of hartshorn and collecting only the first portion that comes over; pale and thin; discolored by light. Antispasmodic, anodyne, and diaphoretic. *Dose.* 10 to 30 drops in water.

OIL OF BENJAMIN. (*Ol. Benzoini.*) From the residuum of the process of preparing benzoic acid. Used to make mock Russia leather.

BIRCH OIL. (*Ol. Betulæ.*) From birch-bark, by heating it in an earthen pot with a hole in the bottom to allow the oil to flow through into another jar sunk in the ground and luted to it. Thick, balsamic, odorous; chiefly used to dress Russia leather.

OIL OF BONES. (*Ol. Ossium.*) Black, fetid; procured from the makers of boneblack: used to make lampblack.

OIL OF BOX. (*Ol. Buxi.*) From boxwood without addition. Resolvent.

OIL OF BRICKS. (*Ol. Lateritium.*) From olive oil mixed with brickdust, and distilled; resolvent, in palsy and gout.—*Factitious oil of Bricks.* Linseed oil 1 lb.; oil of turpentine ½ lb.; oil of hartshorn, or bones, and Barbadoes tar, of each 1 oz.; mix.

OIL, COAL. (See NAPHTHA.)

OIL OF HARTSHORN. (*Ol. Cornu Cervi.*) From harts' horns, by distillation.

OIL OF HEMLOCK. (*Pyroconia.*) By the destructive distillation of hemlock.

OIL OF LETTUCE. (*Empyreumatic.*) From garden lettuce.

OIL OF SOOT. (*Ol. Fuliginis.*) From wood soot; fetid. Used in epilepsy.

OIL OF TAR. (*Jeran. Ol. Pini. O. Pini Rubrum. O. Tædæ. O. Picis liquidæ.*) From tar; reddish; colorless when rectified; soon gets thick. Used as an application to ringworm; contains creosote.

OILS, FIXED. *Syn.* FAT OILS. UNCTUOUS DO. HUILES GRASSES, (*Fr.*) FETTE OELE, (*Ger.*) OLEA EXPRESSA, (*Lat.*) Compounds of carbon, hydrogen, and oxygen, (*hydrocarbons,*) obtained from the organic kingdom, and chiefly distinguished by their insipidity, unctuosity, insolubility in water, and being lighter than that fluid. *Olive oil,* obtained from the vegetable, and *spermaceti oil,* from the animal kingdom, may be taken as types of the rest. The fixed oils are chiefly found in the fruit and seeds of plants, and in thin membranous cells, in various parts of the bodies of animals. Some of these oils are solid at ordinary temperatures; as palm oil, cocoa-nut oil, &c.; but the majority are fluid, except when considerably cooled, when they separate into two portions; the one solid, consisting mostly of stearine, and the other liquid, consisting chiefly of oleine. Nearly all the fixed oils, when freely exposed to the air, absorb oxygen, and either gradually harden, or become rancid. The former are termed drying oils, and are used by painters; the latter are used in cookery, for machinery, lamps, &c. The whole of these oils suffer decomposition at high temperatures, yielding various hydrocarbons; when suddenly exposed to a red heat, they yield a gaseous product, (*oil gas,*) which is used for illumination. It is on this property that candles and lamps furnish their light. The tallow or oil is first converted into gas in the pores of the wick, and this gas, immediately on its formation, enters into combustion, with the production of heat and light. With caustic alkalis and water the fixed oils form soap. When some of these oils are absorbed by porous bodies, and thus expose a vastly increased surface to the air, they absorb oxygen with such rapidity as to generate a considerable degree of heat. Paper, tow, cotton, wool, straw, shavings, &c., slightly imbued with oil, and left in a heap, freely exposed to the air or sun, will often spontaneously inflame. In this way many extensive fires have arisen. The above is especially the case with linseed, rape, and olive oils. The former made into a paste with manganese, rapidly becomes hot, and ultimately takes fire.

Purification. Several fat oils, especially when recently expressed, are purified by violent agitation with 1 to 2§ of concentrated sulphuric acid, when they assume a greenish color, and after about a fortnight, deposite a coloring matter and become paler, and burn with greater brilliancy, particularly if well washed with steam or hot water, and clarified by repose or filtration.—*Another method* is to mix the acid with hot water, and to blow steam through the mixture for some time. The above are generally employed for the glutinous vegetable oils.—*Whale, seal,* or *other fish oil,* is best purified by violent agitation with hot water or steam, by placing it in a deep vessel, and blowing steam into it at the bottom for some time.—*Another method* is to agitate it with a hot infusion of oak bark to remove the albumen and gelatin, next with steam and hot water, and then to filter it through animal charcoal.—Davidson treats whale oil, first with a solution of tan, next with water and chloride of lime, and then with dilute sulphuric acid and warm water.—A very good method is to agitate the oil with a solution of blue vitriol and common salt, and then to filter it through charcoal.—*Olive, almond, castor, rape, nut, linseed,* and some other oils, are readily bleached by exposure to the sun's rays in glass bottles, or by heating them in a wood or tin vessel along with *filtering powder,* 1 to 2 lbs. to the gallon, (see POWDERS,) agitating for some time, and then filtering them. Animal charcoal is also used in the same way. The *first* method is commonly employed by the druggists and colormen to whiten their castor and linseed oils; and the *second,* by the perfumers for the preparation of their WHITE ALMOND AND OLIVE OILS, (*Ol. amygdalæ album. Ol. olivæ album.*) 14 to 21 days' exposure to the sun in fine weather, is usually sufficient for castor oil, when placed in 2 to 4 quart pale green glass bottles, and covered by gallipots inverted over them. The oil should be filtered before exposing it to the light, as, if only slightly opaque, it does not bleach well. Almond and olive oils are apt to acquire a slight sulphurous smell when treated as above; but this may be readily removed by filtration through a little animal

harcoal, or by washing it with warm water. Not nly the above, but all other oils, may be rendered erfectly colorless by the use of a little chromic cid, or by a mixture of a solution of bichromate f potash and sufficient sulphuric, muriatic, or nitric acid, to seize on all the alkali.—Mr. Watt's nethod for purifying fats and oils answers admirably for those intended for illumination. He emloys a mixture of dilute sulphuric acid with a litle nitric acid and bichromate of potash, and some xalic acid, which are added to the oil or fat n the steaming tub; and after thorough admixure, by blowing steam through the mass, 1 lb. of trong nitric acid mixed with 1 quart of water, is dded for every ton of fat, and the boiling contined for half an hour; when a small quantity of aphtha or spirits of turpentine is mixed in, and he whole is finally well washed with water.—Rancid oil is easily purified by boiling it for 15 ninutes with a little water and calcined magnesia, r by filtering it through charcoal.

Purity. The purity of the fixed oils is best asertained from the sp. gr., and by the odor and aste. If pure *olive oil* be shaken in a vial only alf filled, the "*bead,*" or bubbles, rapidly disappear; but if adulterated with poppy or other oil, hey continue longer before they burst.—*Olive oil* s also *completely* solidified when cooled by ice; ut poppy oil remains partly liquid, even when it orms less than one-fourth of the mass.—One part f nitrate of mercury (prepared by dissolving 12 arts of mercury in 15 parts of nitric acid, sp. gr. 1·36) mixed with 12 parts of pure olive oil, and well agitated for some time, will form a solid mass n 24 hours, or less; and the degree of hardness hus assumed may be taken as a measure of the urity of the oil.—When olive oil is "carefully nixed with one-twelfth part of its volume of a soution of ℥iv of mercury in f℥viij, ʒvj of nitric acid p. gr. 1·500, it becomes in 3 or 4 hours like a firm at, without any separation of liquid oil." (P. E.) —*Almond oil* is frequently adulterated with poppy r nut oil, when its density is increased; or by rape il, when its density is lessened.—*Pure castor oil* s wholly soluble in strong alcohol.

Prep. The fixed oils, except where otherwise lirected, are obtained from the bruised or ground ruit or seed, by means of powerful pressure, in crew or hydraulic presses, and are either allowed o clarify themselves by subsidence, or are filtered. The following are the principal *fixed oils* met with n commerce, or which are objects of interest or tility:—

Oil of Almonds. (*Oleum Amygdalæ*, P. L. O. *Amygdalarum*, P. D.) By expression from ither bitter or sweet almonds, usually the forner; sp. gr. 0·916 to 0·918. *Prod.* 45§. Denulcent; emollient.

Oil of Bays. (*Ol. Laurinum. O. Lauri.*)—1. By *expression* from bay berries; fluid, insipid.—2. *Boiled Oil of Bays. Butter of do. Ol. Lauri Nobilis. Do. do. Verum.*) From bay berries by oiling; green, buttery; from Italy.

Oil, Beech. (*Ol. fagi.*) From the nuts of agus silvatica; sp. gr. 0·9225; clear, keeps well; sed for salads.

Oil of Belladonna Seeds. Bland; used for amps in Swabia and Wurtemberg.

Oil of Ben. (*Oil of Behen.*) From the nuts of Moringa aptera; scentless, colorless; keeps long without growing rank. By standing, it separates into two parts, one of which freezes with difficulty. The latter is used in perfumery.

Boiled Oil. (*Drying Oil. Ol. Desiccativum.*) —1. Nut or linseed oil 1 gallon; litharge 12 oz.; sugar of lead and white vitriol, of each 1 oz.; simmer and skim until a pellicle forms, cool, and when settled decant the clear.—2. Oil 1 gallon; litharge 12 to 16 oz.; as last.—3. Old nut or linseed oil 1 pint; litharge 3 oz.; mix, agitate occasionally for 10 days, then decant the clear.—4. Nut oil and water, of each 2 lbs.; white vitriol 2 oz.; boil to dryness.—5. Mix oil with powdered snow or ice, and keep it for 2 months without thawing. Used for paints when wanted to dry quickly.

Oil, Castor. (*Ol. Castorei. O. Ricini*, P. L. E. D.) The best (*cold drawn*) is prepared by pressing the shelled and crushed fruit (seeds) in hemp bags, in a hydraulic press, and heating the oil thus obtained with water in well-tinned vessels till the water boils, and the albumen and gum separate as a scum, which is removed, the oil filtered through flannel, and put into canisters. The commoner kinds are prepared by gently heating the shelled seeds, and pressing them while hot. Another method is to put them into bags, and to boil them in water, when the floating oil is skimmed off. Sp. gr. 0·9611 to 0·969. *Prod.* ·25 to 30§. Chiefly used as a purgative. The best is imported from the East Indies in square tin canisters. It is frequently adulterated with rape oil; but this may be detected by its not dissolving in strong alcohol, and also by its less density. Pure castor oil is soluble in an equal weight of alcohol, sp. gr. 0·820.

Oil, Cod's Liver. (*Ol. Aselli. O. Jecoris Aselli. O. Morrhuæ. Huile de Morue.*) Drains from the livers of codfish, when exposed to the sun, and beginning to putrefy. Imported from Newfoundland. Mr. Donovan recommends the fresh livers to be heated to 192°, and then pressed, and the oil separated from the water, and filtered. Brownish yellow. *Dose.* 1 or 2 tablespoonfuls 2 or 3 times a day, in gout, rheumatism, scrofula, &c. It contains a small quantity of iodine and bromine.

Oil of Colza, from the seeds of brassica campestris oleifera. Sp. gr. 0·9136. *Prod.* 39§; burns well in lamps.

Oil, Croton. (*Ol. Crotonis*, P. E. *O. Tiglii*, P. L.) From the shelled seed of croton tiglium, (Molucca grains;) chiefly imported from the East Indies. Yellow or brownish; strongly cathartic. *Dose.* 1 drop.

Oil, Cucumber. From the seeds of cucurbita pepo and melapepo, sp. gr. 0·9231; used in lamps.

Oil, Garden Spurge. (*Ol. Lathyris.*) From the seeds of euphorbia lathyris; cathartic. *Dose.* 4 to 8 drops. *Prod.* 42§. Croton oil, mixed with 5 or 6 times its weight of nut oil, is usually sold for it.

Oil, Gingilie. (*Benne Oil. Ol. Sesami.*) From the seeds of sesamum orientale; used in salads, and in painting.

Oil, Hemp. (*Ol. Cannabis.*) From hemp seed, (cannabis sativa.) Mawkish; used for frying, mixing paints, making soap, &c. Sp. gr. 0·9276.

Oil, Lard. (*Ol. Adipis.*) By separating the oleine from the stearine of lard by means of hot

alcohol. Largely made in America, where alcohol is cheap.

Oil, Linseed. (*Ol. Lini*, P. L. E. D.)—1. (*Cold-drawn Linseed Oil. Ol. Lini sine igne.*) From the seeds of linum usitatissum et perenne, bruised or crushed, and then ground and pressed without heat. Pale, insipid, viscous; sp. gr. 0·9347; does not keep so well as the next. *Prod.* 18 to 20%.—2. As last, but at a steam heat of 200° F. Amber-colored. *Prod.* 22 to 27%. Both are drying and cathartic. *Used* for painting, in varnishes, &c.

Oil of Mace, expressed. (*Myristicæ Adeps*, P. E. *Ol. Myristicæ Expressum*, P. L.) From nutmegs beaten to a paste, exposed to the steam of water, and pressed between heated plates. Orange-colored, fragrant, spicy; buttery or solid. *Prod.* 18 to 20%. When the last has grown discolored and hard by age, it is called *Banda soap*, (ol. macis in massis.)

Oil, Mustard. (*Ol. Sinapis.*) From the hulls of black mustard seed; viscid, stimulant. Used in rheumatism. The oils from sinapis dichotoma, ramosa, linensis, glauca, and tori, are sweet, and used for the table; sp. gr. 0·9160. *Prod.* Black mustard 18%,—white or yellow do. 36%.

Oil of Myrtle. (*Myrteum.*) From the berries. Butyraceous, odorous.

Oil, Nettle-tree. From the seeds of celtis Australis. Used in lamps.

Oil, Nickar. From guilandina bonducella. Irritant; used in convulsions and palsy.

Oil, Nut. (*Ol. Nucis.*) From hazel nuts, (conglus avellana.) Pale, drying; superior to linseed oil; sold for oils of ben and almonds; sp. gr. 0·9260.

Oil, Olive. (*Sweet Oil. Salad Oil. Ol. Olivæ. Ol. Olivarum.*)—1. From olives by cold pressure, (*virgin oil.*)—2. With the heat of boiling water. —3. By boiling the residuum or marc in water. —4. By allowing the bruised fruit to ferment before pressing. The former are used for salads, but the last two for lamps, making soap, &c.—*Provence Oil* (ol. Provinciale) is the most esteemed; *Florence and Lucca Oils* are also of very fine quality; *Genoa Oil* comes next, and then *Gallipoli Oil*, which forms the mass of what is used in England; *Sicily Oil* is inferior, and *Spanish Oil* the worst imported; sp. gr. 0.9176. *Prod.* 32%. *Sweet Oil droppings* are the foots or deposites, and the *drippings;* it is used for soap and machinery. (See Oils, Fixed.)

Oil, Palm. (*Ol. Palmæ. Palm Butter.*) Sp. gr. 0·968. Orange or red; butyraceous; smells of violets; unchanged by alkalis; bleached by the solar rays, age, exposure, sulphuric acid, chlorine, and chromic acid. Demulcent; used to make soap, candles, and ointments; for the latter chiefly because of its fine color.

Oil of Pine Nuts. (*Ol. Nucis Pini.*) From stone-pine kernels, (pinus pinea;) inferior. *Prod.* 30%.

Oil, Pistachia Nut. Sweet; used for salads.

Oil of Plum Stones. From prunus domesticus; sp. gr. 0·9127. Burned in lamps in Wurtemburg.

Oil, Poppy. (*Oliete. Ol. Papaveris.*) From the seeds of papaver somniferum; sp. gr. 0·9243. Used for salads, in painting, and for making soap; dries and keeps well; sold for almond oil.

Oil, Rape. (*Ol. Rapæ.*) From brassica napus and campestris; sp. gr. 0·9128 to 0·9136. Dries slowly, makes soft soaps, good ointments, but bad plasters; smokes in burning.—*Summer Rapeseed Oil*, from brassica præcox; sp. gr. 0·9139.

Oil, Pale Rape. (*Refined Rape Oil.*) From common rape oil, by violent agitation with 2% of oil of vitriol, and 4 or 5% of water, and after 8 or 10 days' repose, decanting the oil, and filtering through flannel or felt. Used for lamps and blacking.

Oil, Seal. (*Ol. Phocæ.*) Used in lamps.

Oil, Spermaceti. (*Ol. Cetacei.*) From the head matter of the fish; smells little, and burns well; other pale fish oils, filtered through charcoal, are commonly mixed with it, or sold for it.

Oil, Walnut. (*Ol. Nucis Juglandis.*) From Juglans regia; soon gets rank. Used to make plasters and paints; dries well; sp. gr. 0·9260. *Prod.* 50%; when *cold drawn*, it is eaten with salads.

Oil, Whale. (*Train Oil. Ol. Cetaceum.*) From several varieties of the fish; coarse, stinking; sp. gr. 0·9231. Used for machines, in lamps, &c. The southern whale oil is the best.

Oil of Wine Stones. From the seeds of grapes; sp. gr. 0·9202; bland, emollient, pale yellow. *Prod.* 10 to 11%.

Oil of Yelk of Eggs. (*Ol. Ovi.*) From yelks of eggs, boiled or fried hard, and then pressed; or broken up, digested in hot alcohol, the tincture filtered, and the spirit distilled off. Commonly used to "*kill*" quicksilver on the Continent.

OILS. (*By infusion.*) *Syn.* Olea infusa. Ol. cocta. These are generally prepared by either digesting or gently boiling the ingredients in 3 or 4 times their weight of olive oil till they become dry and crisp, when they are either pressed or drained dry, and the oil either filtered or allowed to clarify by subsidence. The following are the principal oils that are prepared by *infusion:*—

Oil of Belladonna. (*Ol. Belladonnæ*, P. Cod.) Fresh leaves 1 lb.; olive oil lb. ij.

Oil of Chamomile. (*Ol. Anthemidis*, P. Cod.) Leaves and flowers 1 lb.; olive oil 3 lbs.; as last.

Oil of Cantharides. (*Ol. cum Cantharidibus*, P. Cod.) Powdered flies ℥iv; olive oil ℥xxxij; digest 6 hours in a water-bath, and strain with pressure. Stimulant.

Oil of Earthworms. (*Ol. Lumbricorum.*) From earthworms.

Oil, Green. (*Green Elder Oil. Ol. Viride. O. Sambuci viride.*)—1. Green elder leaves 1 lb.; olive oil 1 quart; boil till the leaves are crisp, press out the oil, and again heat it till it turns green.—2. As last, but by maceration under 212°.—3. Elder leaves 1 cwt.; linseed oil 3 cwt. The last is the form usually employed on the large scale. It is generally colored with verdigris ½ lb. to the cwt., the last thing before putting it into casks; as, without great skill and the full quantity of leaves, a very deep green color cannot be obtained. The oil is got from the leaves by allowing them to drain in the pan or boiler, (with a cock at the bottom,) and well heated. Emollient; used as a liniment.

Oil of Hemlock. (*Ol. Conii*, P. Cod.) As oil of belladonna.

OIL OF HENBANE. (*Ol. Hyoscyami*, P. Cod.) As oil of belladonna.

OIL OF MUCILAGES. (*Ol. Mucilaginum.*)—1. P. L. 1746.) Marshmallow root lb. ss; linseed and fenugreek seed, of each ℥iij; water 1 quart; boil 1 hour, add olive oil 2 quarts, and boil till the water is consumed.—2. Fenugreek seeds 8 oz.; linseed oil 1 quart; infuse a week, and strain. Emollient.

OIL OF OPIUM. (*Ol. Opiatum.*) Olive oil ℥vj; opium ʒj; digest at a moderate heat for 2 hours.

OIL OF ROSES. (*Ol. Rosæ. Ol. Rosaceum.*) Rose petals, beat to a pulp, 4 or 5 oz.; olive oil 1 pint; macerate in the sun or a warm place, in a covered vessel for a week, and press out the oil; repeat the process with fresh roses till the oil smells sufficiently strong, then filter. For the hair.

OIL OF ST. JOHN'S WORT. (*Ol. Hyperici. Bals. do.*) Flowers 4 oz.; sweet oil 2 lbs.; infuse till well colored. A mixture of equal parts of rape and green oils is usually sold for it.

OIL OF RUE. (*Ol. Rutæ*, P. Cod.) From the leaves, as oil of chamomile.

OIL OF SCORPIONS. (*Ol. Scorpionum.*) Live scorpions 30 in No.; almond oil 2 lbs.; expose to the sun or warmth for 40 days, and strain. Centipedes are usually substituted for scorpions. Emollient, diaphoretic, and stimulant.

OIL OF STRAMONIUM. (*Ol. Stramonii*, P. Cod.) As oil of belladonna.

OIL OF TOBACCO. (*Ol. Tabaci*, P. Cod.) As the last.

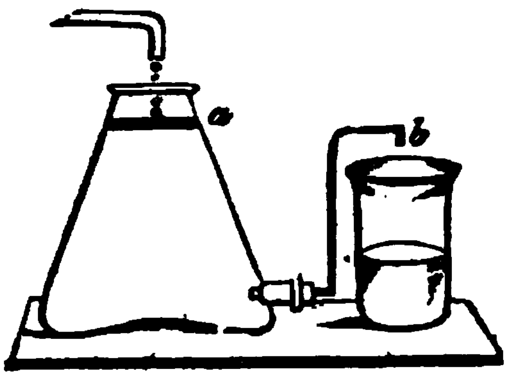
OIL OF WHITE LILIES. (*Ol. Liliorum*, P. Cod.) As oil of chamomiles. Emollient. Olive oil is usually sold for it.

OILS, VOLATILE. *Syn.* ESSENTIAL OILS. DISTILLED DO. OLEA DISTILLATA. OLEA VOLATILE, (*Lat.*) HUILES VOLATILES, (*Fr.*) FLÜCHTIGE; AETHERISCHE OELE, (*Ger.*) Volatile oils are chiefly obtained from the flowers, leaves, fruit, seeds, bark, and roots of plants, by distilling them with water. They are usually more limpid and less unctuous than the fixed oils; but some of them are butyraceous or crystalline. The majority, when perfectly pure, are colorless, though before rectification nearly the whole of them have a pale yellow tint, and some of them are brown, blue, or green. Their density fluctuates a little on either side of water, and they are sparingly soluble in that fluid, forming perfumed or medicated waters. The lightest oil is that of citrons, sp. gr. 0·847,) and the heaviest that of sassafras, sp. gr. 1·096.) They possess various degrees of volatility, and evolve the odor of the plants from which they are distilled. By exposure to the air they rapidly absorb oxygen, and become partially converted into resin. This is the cause of the deposite that usually forms in them, especially in the expressed oil of orange when kept in an ill-corked vessel. The essential oils are often called *essences*, and the same term is commonly applied to their alcoholic solutions. (See ESSENCES.) Some volatile oils, as those of turpentine, lemons, and copaiba, are compounds of hydrogen and carbon only, (hydrocarbons;) but the majority contain oxygen as one of their constituents. They are chiefly used by perfumers and rectifiers, and in medicine; and some of the cheaper kinds are largely employed as vehicles for colors, and in the manufacture of varnishes. The *dose* of the aromatic and carminative oils, is from 1 to 10 drops, on sugar.

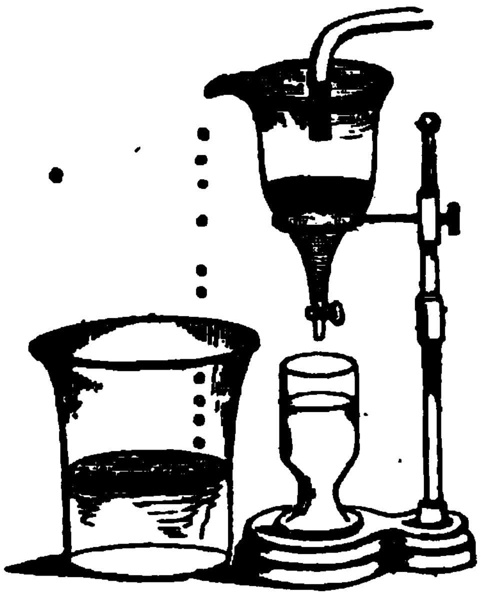
Purity. The essential oils of commerce are often adulterated with fat oils, resins, spermaceti, balsam of copaiba, alcohol, or cheaper essential oils. Any of these, except the last two, may be detected by placing a drop of the suspected oil on a piece of paper, and exposing it to heat. If pure, the oil will be entirely evaporated; but if adulterated, a greasy or translucent stain will be left on the paper. These substances will also remain undissolved when the oil is agitated with thrice its volume of rectified spirit of wine. The presence of alcohol may be detected by agitating the oil with a few small pieces of dry chloride of calcium, which will remain unaltered in a pure essential oil, but will mix with one containing alcohol, and separating the latter, dissolve in it, forming a liquid stratum at the bottom of the vessel. When only a very little alcohol is present, the pieces change at least their form. (Borsarelli.) Another test is the milkiness occasioned by the addition of a little water, as well as the loss of volume of the oil when it separates. This species of adulteration is very common, especially in cold weather, when it is a general practice of the druggists to add spirit to their oils to render them transparent. Oil of cassia is very commonly treated in this way. The admixture of an inferior essential oil with one more costly, may be best detected by pouring a drop or two on a piece of porous paper or cloth, and shaking it in the air, when, if occasionally smelled to, the difference of the odor at the beginning and the end, will show the adulteration, especially if it be turpentine. The latter may also be detected by agitating the oil with spirit of wine as above, when it will remain undissolved. The purity of essential oils may likewise be determined by taking their sp. gr.; or, still more accurately, by measuring their index of refraction, as suggested by Dr. Wollaston. The adulteration of a heavy oil with a light one, or the reverse, may be detected by agitating the suspected oil with water, when the one will sink, and the other float.

Prep. The volatile oils are generally obtained by distilling the articles along with an equal weight of water; but some substances that give out their oil with difficulty, are first soaked for 24 hours in twice their weight of water, to each gallon of which 1 lb. of common salt has been added, by which its boiling point is raised, and consequently the oil comes over more easily. In such cases a quick fire is used, and when one half the water has come over, it is returned into the still, and this cohobation is repeated until the distilled water ceases to come over mixed with oil. The heat of steam or a salt water-bath should be preferably employed; but if a naked fire be used, the still should be deep and narrow, by which means the bottom will be more perfectly covered with a small quantity of water, and empyreuma prevented. When the distilled water is to be repeatedly cohobated on the ingredients, a very convenient plan is to so arrange the apparatus that, after the water has separated from the oil, it shall flow back again into the still, by

which much time and trouble will be saved. The separation of the oil and water is effected by allowing the mixed liquids to drop into a Florentine receiver, (see engr.,) when the oil is the lighter of the two, by which means the latter accumulates at *a*, and the water flows over by the spout *b*.



The same receiver may be employed for oils heavier than water, by reversing the arrangement; but a glass *separator* (see engr.) will be found more convenient. In this case the oil accumulates at the bottom of the vessel, and may be drawn off by the cock. The *essential oils of lemons, oranges*, and some other fruits, are chiefly obtained by submitting the yellow rind to



powerful pressure; but in this way they are not so white, nor do they keep so well as when distilled.

The rectification of volatile oils is performed without water, by the careful application of a heat just sufficient to make them flow over pretty rapidly, so that they may be kept heated for as short a time as possible. One-half, or at most, two-thirds only, is drawn off; that left in the retort being usually mixed with raw oil, intended to be sold in that state.

The following are the principal *volatile oils* that are articles of commerce, or objects of interest:—

Oil of Acorus. (*Oleum Acori. O. Calami Aromatici.*) From the fresh rhizomes or roots; yellow; used to scent snuffs, aromatic vinegar, &c. *Product.* ¼ to ½ of 1%.

Oil of Amber. (*Ol. Succini.* P. L. & D.) From coarse pieces of amber in an iron retort, either alone, or powdered and mixed with sand. The oil is separated from the succinic acid and fetid liquor that passes over, and rectified by a gentle heat. *Prod.* 20%; sp. gr. 0·758 at 75°; pale yellow; stimulant, antispasmodic, and rubefacient. Used in rheumatism, hooping-cough, &c. Scrapings of copal and gammar resin are frequently substituted for amber, and it is commonly adulterated with mineral naphtha.

Oil of Aniseed. (*Ol. Anisi,* P. L. E. & D.) From the fruit, (seeds;) nearly colorless; when pure it congeals at 50°, and does not melt again below 63°; sp. gr., English, 0·9768—foreign, 0·9903; alcohol of 0·84 dissolves 0·42 of its weight. *Prod.* Less than 2%. Carminative, much used in coughs, colds, &c. It is frequently adulterated with oil of almonds, when spermaceti or camphor is added to make it candy. (See above.) The water in the refrigerator should not be colder than 65° F.

Oil of Star-anise. (*Ol. Badiani. Ol. Anisi stellati.*) From the capsules. Used to adulterate the last. *Dose* of both the above, 6 to 15 drops.

Oil of Balm. (*Ol. Melissæ.*) From the herb; pale yellow; odorous; sp. gr. 0·975. *Prod.* $\frac{1}{12}$ of 1% Oil of lemons is usually sold for it.

Oil of Bergamotte. (*Essence of Bergamotte. Ol. Bergamii. Ol. Bergamottæ.*) By expression from the yellow rind of the bergamotte orange. Pale greenish yellow; fragrant; sp. gr. 0·885. From Italy. It may be obtained purer by distillation. Used as a perfume.

Oil of Bitter Almonds. (*Essential Oil of Almonds. Ol. Amygdalæ Amaræ.*) From ground bitter almond cake, from which the oil has been pressed out, soaked for 24 hours with twice its weight of water, and ½ or ¼ its weight of salt, and the whole distilled, allowing the first half of the water that comes over to deposite its oil, and then run back into the still. Or by exposing the bruised almond cake on a sieve or frame over the water in the still, when the steam passes through it and carries off the volatile oil, which condenses along with the water in the refrigerator. Pale golden yellow; colorless when rectified; tastes powerfully nutty; sp. gr. 1·0836; mixed with oil of vitriol, it strikes a fine red color. *Prod.* Less than ½ of 1%. *Poisonous.* Used instead of prussic acid in some diseases, and dissolved in spirit, by cooks, confectioners, and perfumers, to impart a nutty taste or flavor. *Dose.* ¼ to 1½ drops. It is 4 times as strong as ordinary prussic acid.

Oil of Cajeput. (*Ol. Cajeputi. Kyapootie oil.*) From the dried leaves of the melaleuca leucadron. Usually green, but *white* when pure; odorous; aromatic; sp. gr. 0·925; when rectified, two oils come over,—the *first* colorless, sp. gr. 0·897; the *second* green, sp. gr. 0·920. Its green color is derived from chloride of copper, which may be recognised by the red precipitate occasioned by agitating the oil with a solution of prussiate of potash (Guibourt.) *Dose.* 3 to 5 drops on sugar, in rheumatism and cholera. A spurious kind is made of oil of rosemary, flavored with camphor, and the oils of peppermint and cardamoms, and colored with verdigris. From the East Indies.

Oil of Camphor. (*Ol. Camphoræ Volatile.*) From the wood of the camphor tree of Borneo and Sumatra. Colorless when rectified; sp. gr. 0·91.

Oil of Caraway. (*Ol. Carui,* P. L. E. D.) From caraway seeds. Nearly colorless; aromatic; carminative; sp. gr. 0·950. *Prod.* 5%. Frequently adulterated with oil of cumin.

Oil of Cardamoms. (*Ol. Cardamomi Essent.*) From the seed; sp. gr. 0·943. *Prod.* 5%. Colorless; fragrant; carminative.

Oil of Cassia. (*Ol. Cassiæ,* P E.) From

assia buds or bark; golden yellow; aromatic; odorous; sp. gr. 1·071 to 1·095. *Prod.* Buds, less than 1§. Nitric acid converts it into a crystalline mass. Frequently sold for oil of cinnamon. Chiefly imported.

OIL OF CEDRAT. (*Essence of Cedra. Do. of Cedrat. Oglio del Cedro. Ol. Citri finum. Ol. Cedri.*) From the external yellow rind of citrons, either by expression or distillation; preferably the latter. The first portion of oil that comes over is colorless; the latter greenish. 100 citrons yield . oz. of white and ½ oz. of green oil. Very fragrant.

OIL OF CHAMOMILE. (*Ol. Anthemidis*, P. L. E. *O. Chamæmeli. Do. do. Romani.*) From the flowers; blue, turning yellow and brown by exposure; fragrant; sp. gr., English, from the flowers, 0·9083; foreign, 0·9289. *Prod.* 1 to 2§. Stimulant and antispasmodic.

OIL OF CHERRY-LAUREL. (*Ol. Lauro-cerasi.*) From cherry-laurel leaves. Resembles oil of bitter almonds. *Poisonous.*

OIL OF CINNAMON. (*Ol. Cinnamoni*, P. L. E. D.) From the bark macerated for several days in salt water. Yellow or reddish; sp. gr. 1·035. *Prod.* 1§. Very aromatic. It is chiefly imported from Ceylon, where it is distilled from bark that is unfit for exportation. The dark is usually rectified when two pale oils are obtained; one lighter, and the other heavier than water; but 10§ is lost by the process. "Odor purely cinnamic; nitric acid converts it into a nearly uniform crystalline mass." (P. E.)

OIL OF CITRONS. (*Essence of Citrons. Ol. Citri.*) From the lees of citron juice; or from the whole peels, either by distillation or expression. The latter does not keep well. Fragrant.

OIL OF CLOVES. (*Essence d'œilettes. Ol. Caryophylli*, P. L. & E. *O. Eugeniæ Caryophyllatæ*, P. D. *Ol. Caryophyllorum.*) From cloves well soaked in and distilled with salt water; the distilled water, after depositing its oil, being returned 3 or 4 times into the still on the same cloves. Colorless or pale yellowish; strongly odorous and aromatic; sp. gr. 1·055 to 1·061. *Prod.* 16 to 23§. A heavy oil, sp. gr. 1·079, (*Cloveic acid, Eugenic acid, Caryophyllic acid,*) comes over first, followed by a light oil, sp. gr. 0·918, (*clove hydrocarbon;*) by rectification, much of the light oil is lost, and the product becomes denser. (1·361, Bonastre.) Oil of cloves is frequently adulterated with inferior essences, especially those of pinks and clove-gillyflowers, and often with castor oil.

OIL OF COPAIBA. (*Ol. Copaibæ.*) Copaiba ℥j; water Oiss; distil, returning the water into the still, until oil ceases to come over. (P. E.) On the large scale the oil is usually obtained by distilling the crude oil that separates during the manufacture of the *specific solution of copaiba.* Colorless; sp. gr., when free from water, 0·878. *Prod.* 50 to 55§. *Dose.* 10 to 20 drops, on sugar, in the usual cases where copaiba is ordered.

OIL OF CORIANDER. (*Ol. Coriandri.*) From the seeds; fragrant; aromatic; yellowish.

OIL OF CUMIN. (*Ol. Cumini. O. Cymini.*) From the fresh fruit, (seed;) pale yellow; smells of the seeds. *Prod.* 2½ to 3§.

OIL OF CUBEBS. (*Ol. Cubebæ*, P. E.) From coarsely ground cubebs; nearly colorless; hot; aromatic; sp. gr. 0·929. *Prod.* 10 to 11§. *Dose.* 10 to 20 drops or more, where the use of cubebs is indicated.

OIL OF DILL. (*Ol. Anethi*, P. E.) From the bruised fruit or seed. Pale yellow; sp. gr. 0·881; odorous; carminative. *Prod.* 4§.

OIL OF ELDER. (*Otto of Elder Flowers. Ol. Sambuci*, P. L.) From elder flowers; buttery; odorous.

OIL OF ERGOT. (*Ol Ergotæ.*) Prepared by evaporating the ethereal tincture at a very gentle heat. Brownish yellow; lighter than water. *Dose.* 10 to 50 drops, where the use of ergot is indicated.

OIL OF FENNEL. (*Ol. Fœniculi vulgare.*) From the fruit or seeds of the common or wild fennel. Pale yellow; sp. gr. 0·997; congeals by cold.

OIL OF GRAPE SPIRIT. (*Brandy oil.*) Obtained after the spirit has passed over, during the distillation of the fermented residuum of expressed grapes. Odorous; acrid; soon turns yellow in the air; 6 or 7 drops will spoil a hogshead of spirit.

OIL OF GRAIN SPIRIT. Butyraceous. (See FERMENTATION.)

OIL OF HOPS. (*Ol. Lupuli.*) From hops by distillation; also collected during the brewing of beer. Odorous; acrid; narcotic; soluble in water; sp. gr. 0·910; chiefly used to increase the flavor of poor hops.

OIL OF HYSSOP. (*Ol. Hyssopi.*) From hyssop leaves. *Prod.* ⅛ to ¼ of 1§.

OIL OF JASMIN. (*Ol. Jasmini.*) By placing alternate layers of the flowers and cotton wadding, imbued with olive oil, in any suitable vessel, and renewing the flowers till the fixed oil becomes strongly odorous, and then distilling the wadding along with water. The *oils of violets, tuberose, hyacinths, &c.*, are also obtained in the same way. Used in perfumery.

OIL OF JUNIPER. (*Ol. Juniperi*, P. L. E. D.) From either the wood, tops, or berries; the latter should be chosen *fully grown*, but *still green*, and should be bruised. Colorless, or nearly so; sp. gr. 0·875 to 0·911. *Prod.* German berries ½ to 1§. Diuretic. It is frequently adulterated with oil of turpentine, but then its density is lessened.

OIL, KRUMHOLZ. (*Ol. Templinum.*) From Hungarian balsam. Fragrant; golden yellow; tastes oily acidulous.

OIL OF LAVENDER. (*Essence of Lavender. Ol. Lavandulæ*, P. L. E. D. *O. Lav. Spicæ.*) From the flowers; pale yellow; very fragrant; sp. gr. 0·877 to 0·905; the lightest is the best. *Prod.* 1½ to 2§. English oil of lavender is the best; the foreign oil (*O. Lav. latifolæ*) is inferior. When rectified by drawing off only ⅞, its sp. gr. is 0·877; very fine.

OIL OF LEMONS. (*Essence of Lemons. Ol. Limonis*, P. L. E.) Obtained by exposing the yellow rinds to powerful pressure in hair bags. It may also be prepared by distillation. Nearly colorless; very fragrant; sp. gr. 0·878; or 0·847 at 72°. Carminative and diaphoretic. Chiefly from Italy.

OIL OF LEMON GRASS. From Andropogon Schœnanthus. Very fragrant. *The grass oil of Namur* is obtained from Andropogon Calamus Aromaticus. Both are used in perfumery.

OIL OF LEMON THYME. (*Huile de Tain. Ol.*

Serpylli.) Very odorous. Used to scent soaps. *Product.* ⅛ to ¼ of 1℥.

Oil of Mace, Essential. (*Ol. Macidis. O. Macis Stillatitium.*) Nearly colorless; lighter than water; very odorous.

Oil of Marjoram. (*Ol. Marjoranæ.*) From sweet marjoram; pale yellow; odorous. *Prod.* ⅓ to ½ of 1℥.

Oil of Mustard, Volatile. (*Ol. Sinapis Essent.*) As oil of bitter almonds; nearly colorless; very pungent and acrid; sp. gr. at 68°, 1·015. Rubefacient; vesicant; in palsy, &c. The distilled water is a good cure for the itch.

Oil of Narcissus. (*Essence of Jonquil. Ol. Narcissi.*) As oil of jasmine. Odorous.

Oil of Nutmeg. (*Ol. Myristicæ,* P. L. E. *O. Nucis moschatæ.*) From nutmegs. Nearly colorless; odorous; sp. gr. 0·948; by agitation with water it is separated into 2 oils; one lighter, the other heavier than water; the last is butyraceous. Imported.

Oil of Orange. (*Essence of Orange. Ol. Aurantii.*) From the yellow rind of the sweet orange, (*Citrus Aurantium.*)

Oil of Orange Flowers. (*Ol. Neroli. O. Naphæ.*) From the flowers of the sweet orange tree. Very fragrant. 6 cwt. only yield 1 oz. A similar oil is obtained from the flowers of the bigarade, or bitter orange.

Oil of Bitter Orange. (*Essence of Bitter Orange.*) From the rind of the bigarade orange. Slightly differs from the oil of the peel of the sweet orange.

Oil of Orris. (*Essence of Violets. Ol. Iridis.*) From Florentine orris root. Fragrant.

Oil of Pennyroyal. (*Ol. Pulegii. O. Menthæ Pulegii.* P. L. E. D.) From the herb: pale; carminative; sp. gr. 0·925 to 0·930. *Prod.* ¾ to 1℥.

Oil of Pepper. (*Ol. Piperis.*) From black pepper. Colorless; odorous; not so hot as pepper, sp. gr. 0·9932.

Oil of Peppermint. (*Ol. Menthæ Piperitæ,* P. L. E. D.) From the fresh herb. Nearly colorless; odorous; carminative; cooling; sp. gr. 0·902 to 0·907. *Prod.* ½ to 1¼℥. English oil of peppermint is the best; and that distilled at Mitcham, Surrey, is most esteemed: it has usually a very pale greenish color; foreign oil of peppermint is very inferior. It is improved by "*redrawing*" it. The oil of the shops is usually reduced with ½ spirit of wine.

Oil of Pimento. (*Oil of Allspice. Ol. Pimentæ,* P. L. E. D.) From bruised allspice, pale yellowish; has a mixed odor of cloves and cassia; sp. gr. 1·021. *Prod.* 5 to 8℥. It contains 2 oils; one (light) which distils over first, and another (*Pimentic Acid*) which comes over afterwards.

Oil of Potato Spirit. Obtained by continuing the distillation after most of the spirit has passed over. Colorless; sp. gr. 0·823; burns well. (See Fermentation.)

Oil of Rhodium. (*Ol. Rhodii.*) From the wood of convolvulus scoparius; fluid; yellow; fragrant. *Prod.* ⅛ to ⅙ of 1℥; chiefly used to adulterate otto of roses; oil of sandal wood is frequently sold for it; from the Levant.

Oil of Roses. (*Ol. Rosæ.*)—1. From the flowers of the musk rose, as oil of cloves. *Prod.* $\frac{1}{25}$ to $\frac{1}{16}$ of 1℥. Oil of sandal wood is commonly sold for it.—2. (*Otto of Roses. Attar of do. Ol. Rosæ,* P. E.) From the petals of rosa centifolia and sempervirens, by saturating the water, by returning it repeatedly on fresh flowers, and then exposing it to a low temperature. In the East it is obtained by stratifying gingilie seeds in alternate layers with rose leaves, for some days, and repeating the arrangement with fresh roses till the seeds are saturated, when the oil is expressed and distilled along with water. In the neighborhood of Mecca the rose leaves are macerated in salt and water for 2 or 3 days, and then distilled, the water being received in separate receivers at different parts of the process. The water is afterwards exposed in porous earthenware vessels, tied over with linen, in trenches dug in the earth, and over which moistened straw is thrown, when in a short time the otto separates and floats on the surface. Pure otto congeals below 80°, and melts again at 85° F.; sp. gr. at 90°, 0·832 to water 1·0 at 60° F.; alcohol at 0·806 dissolves less than 1℥; imported. Otto of roses is frequently adulterated with the oils of rhodium and sandal wood, both of which render its taste biting, and with camphor and spermaceti.

Oil of Rosemary. (*Ol. Rorismarini,* P. L. E. D. *O. Anthos.*) From rosemary tops; colorless; sp. gr. 0·897 to 0·910; odorous. *Prod.* About 1℥. It is frequently adulterated with oil of turpentine, but is then only partially soluble in alcohol.

Oil of Rue. (*Ol. Rutæ,* P. E. D.) From the herb; pale yellow; acrid; bitter; sp. gr. 0·911. *Prod.* ½ to 1℥.

Oil of Sandal Wood. (*Ol. Santali albi.*) 4 lbs. yield 1 oz.; sold for oil of rhodium and otto of roses.

Oil of Sassafras. (*Ol. Sassafras* P. D.) From the wood of the lauras sassafras, as oil of olives; pale yellow; hot; odorous; sp. gr. 1·094 to 1·096. *Prod.* 2 to 2½ ℥; nitric acid turns it orange red, and water separates it into a light and heavy oil. Imported.

Oil of Savin. (*Ol. Sabinæ,* P. E. D) From the fresh tops or leaves; nearly colorless; acrid; sp. gr. 0·915; yields much oil; emmenagogue; rubefacient.

Oil of Spearmint. (*Oil of Green-mint. Ol. Menthæ Vulgaris. O. Menthæ Sativæ. O. Menthæ Viridis,* P. L. E. D.) From the herb; pale yellow; odorous; carminative; stimulant; sp. gr. 0·914, (0·9394 Brande.) *Prod.* ⅕ to ¼ of 1℥.

Oil of Spike, True. (*Ol. Lavandulæ stæchadis. O. Spicæ Verum. Huile d'aspic.*) From the flowers and seeds of Lavendula stæchas, (French lavender,) inferior to English lavender. From France. Used by artists, and to make varnishes.

Oil of Sweet Fennel. (*Ol. Fœniculi,* P. E. D. *O. Fœniculi Dulcis.*) From the bruised seeds; odorous; carminative; sp. gr. 0·997. *Prod.* 3 to 4℥.

Oil of Tansy. (*Ol. Tanaceti.*) From the herb; pale greenish yellow; odorous; aromatic; sp. gr 0·946 to 0·952; bitter.

Oil of Thyme. (*Ol. Thymi. Ol. Origani,* P. L. E. D.) From the herb origanum vulgare, (common marjoram;) reddish; colorless when rectified; fragrant; sp. gr. 0·867 to 0·877, (0·940 Baume.) *Prod.* ½ to ¾ of 1℥. *Used* to relieve toothache, to make the hair grow, and as a stimu-

lating liniment. The oil of the shops is usually mixed with ½ oil of turpentine.

Oil of Tobacco. (*Ol. Tabaci. Nicotianin. Tobacco Camphor.*) From tobacco leaves; 6 lbs. yield 11 grs.; concrete.

Oil of Turpentine. (*Spirits of Turpentine. Essence of do. Turps. Camphene, Camphogene. Spiritus Terebinthinæ. Ol. do.*, P. L. E. D. *O. pini volatile.*) From a mixture of strained American turpentine and water. The residuum in the still is rosin. *Prod.* 14 to 16ꝰ. The colleges order it to be rectified along with 3 or 4 times as much water, and not to draw over quite the whole; but a better way is to agitate with an equal measure of liquor of potassa, and then to distil the mixture. Dr. Nimmo recommends it to be purified by agitation with ⅛th part of alcohol, to decant the spirit, and to repeat the process 3 or 4 times. Pure oil of turpentine is neutral to test paper; dissolves one-fifth of alcohol, sp. gr. 0·830, and is soluble in 3 parts of alcohol of 0·840; sp. gr. 0·872 at 60°, or 0·86 at 70° F. Used to make varnishes and paints; under the name of Camphene, to burn in lamps; and in medicine as a vermifuge, diuretic, in rheumatism, &c. *Dose.* 6 to 60 drops; or for tapeworm, f℥ss to f℥iss. Gives a violet odor to the urine.

Oil of Wax. From butter of wax.

Oil of Wine. (*Ethereal Oil, Sweet Oil of Wine. Do. do. of Vitriol. Sulphatic Ether. Sulphate of Hydrocarbon. Sulphate of Oxide of Ethule and Etherole. Ol. Vini. Ol. Æthereum.* P. L. *Liquor Æthereus Oleosus*, P. D.) Rectified spirit, lb. ij; sulphuric acid, lb. iv; mix (cautiously) and distil till a black froth arises; then remove the heat, collect the light supernatant liquor, expose it to the air for 24 hours, agitate it with a mixture of f℥j each of distilled water and liquor of potassa, and after subsidence separate the ethereal oil. (P. L.) The Dublin College orders it to be prepared from the residuum of the distillation of ether, which must be distilled to one half, and the oil next be collected as before. 33 lbs. of rectified spirit, and 64 lbs. of oil of vitriol, only yield 17 oz. of this oil. (Hennel.) An oily liquid; nearly colorless; aromatic; neutral; sp. gr. 1·05, (Hennel,) 1·13, (Serullas;) boiling at 540°; soluble in alcohol and ether. Anodyne.

Oil of Wormwood. (*Ol. Absinthii.*) From the herb; green, or brownish green; odorous; acrid; bitter; sp. gr. 0·9703, (Brisson;) 0·9725, (Brandes.) *Prod.* ¼ to ½ of 1ꝰ. Nitric acid sp. gr. 1·25, colors it first green, then blue, and lastly brown.

OINTMENT. *Syn.* Unguentum, (*Lat.*, from *Ungo*, I anoint.) Ointments are unctuous preparations, that merely differ from cerates in consistence, being made and used in a similar manner. Their solidity should not exceed that of good butter, at the ordinary temperature of the atmosphere. When the active ingredients are pulverent substances, nothing can be more suitable to form the mass of the ointment than *good* lard, free from salt; but when they are fluid, or semifluid, prepared suet, or a mixture of suet and lard, will be necessary to give a proper consistence to the compound; in some few instances, wax is ordered for this purpose. Unctuous preparations may be prevented from getting rancid, by dissolving in the fat a little gum-benzoin or benzoic acid. (See Cerates.)

OINTMENT, ACETATE OF LEAD. *Syn.* O. of Sugar of Lead. Ung. Saturninum. Ung. Plumbi Acetatis, (P. E. & D.) *Prep.* (P. E.) Finely-powdered sugar of lead ʒj; simple ointment ℥xx; triturate together. (See Cerates.)

OINTMENT, ACONITINA. *Syn.* Ung. Aconitinæ. *Prep.* (Paris.) Aconitina 1 gr.; lard ʒj; mix. (See page 25.)

OINTMENT, ALKALINE. *Syn.* Ung. Alkalinum. *Prep.* (Cazenave.) Subcarbonate of potash 1 part; lard 8 parts; mix. Used in some skin diseases. Soubeiran adds wine of opium, ½ to 1 part.

*** In the same way is made the ointment of balsam of Peru. (*Ung. Peruviani.*)

OINTMENT, ALTHÆA. *Syn.* Marshmallow Ointment. Dialthææ. Ung. Althææ. *Prep.* I. (P. L. 1746.) Oil of mucilages lb. ij; beeswax lb. ss; yellow rosin ℥iij; Venice turpentine ℥ss; melt together, and stir till cold.

II. Linseed oil 8 lbs.; beeswax 2 lbs.; yellow rosin 1 lb.; palm oil ½ lb.; as last. Emollient and stimulant.

OINTMENT, AMMONIACAL. *Syn.* Pommade de Gondret. Liparole d'Ammonique. Ung. Ammoniæ. *Prep.* (P. Cod.) Prepared suet and lard, of each ℥j; melt in a wide-mouthed bottle, add liquor of ammonia ℥ij, cork close, and agitate till cold. Rubefacient, vesicant, and counter-irritant. Rubbed on the skin and covered so as to prevent evaporation, it speedily raises a blister.

OINTMENT, AMMONIA. *Syn.* Ung. Ammoniæ Sesquicarbonatis. *Prep.* Sesquicarbonate of ammonia ʒss; simple cerate ℥ss; mix. For scrofulous sores.

OINTMENT, ANTIMONIAL. *Syn.* Tartar Emetic Ointment. Ung. Antimoniale, (P. E.) Ung. Tartari Emetici, (P. D.) Ung. Antimonii Potassio-Tartratis, (P. L.) *Prep.* (P. L. & E.) Finely-powdered potassio-tartrate of antimony 1 part; lard 4 parts; mix. The Dublin ointment is only half as strong; counter-irritant, in phthisis, chronic rheumatism, &c. A portion the size of a nut is rubbed on the skin night and morning, until a crop of pustules is produced.

OINTMENT, ANTI-HERPETIC. *Syn.* Ung. Anti-herpeticum. *Prep.* I. (Chevallier.) Chloride of lime ʒiij; subsulphate of mercury ʒij; almond oil ʒvj; lard ℥ij; mix.

II. (Alibert.) Red sulphuret of mercury ʒiss; powdered camphor ʒss; lard ℥iss; mix. For herpes or tetters.

OINTMENT, ANTI-PERIODIC. *Prep.* Lard 95 grammes; sulphate of quinine 15 grammes; sesquioxide of iron 60 centigrammes; powdered opium 15 centigrammes; mix. Well rubbed on the vertebral regions every two hours for 3 or 4 days, in periodic fevers, especially those accompanied with vomiting. (Jour. de Chimie Med.)

OINTMENT, ANTIPSORIC. *Syn.* Ung. Antipsoricum. *Prep.* (P. E. 1744.) Elecampane root and sharp-pointed wild dock leaves, of each ℥iij; water 2½ pints; vinegar ℥xvj; boil to ½, press, add liquor of water-cresses ℥x; lard lb. iv; boil to dryness, and further add, beeswax and oil of laurel berries, of each ℥iv; mix well. For itch, the *ung. antipsoricum comp.* was made by adding

℥viij of strong mercurial ointment to the above. (See Itch Ointment.)

OINTMENT, ARSENICAL. *Syn.* Ung. Arsenici. *Prep.* I. (P. U. S.) Arsenious acid in fine powder ℈j; simple cerate ℥j; mix. Used for dressing cancerous sores. *Poisonous.*

II. (Carmichael.) Arsenite of iron ʒss; phosphate of iron ʒij; spermaceti ointment ʒvj; mix.

III. (Sir A. Cooper.) White arsenic and sulphur, of each ʒj; spermaceti ointment ℥j. *** All the above must be used with caution.

OINTMENT, ASTRINGENT. *Syn.* Ung. Astringens. *Prep.* Lard 5 oz.; finely-powdered alum 1 oz.; mix. (See also the several lead ointments, and ointment of galls.)

OINTMENT, BALSAM OF PERU. *Syn.* Ung. Peruviani comp. *Prep.* (Copland.) Lard ℥ij; white wax ℥ss; melt in a water-bath, add balsam of Peru ʒij, and oil of lavender 12 drops, and stir till stiff. Both this, and the simple ointment, are used to restore the hair.

OINTMENT, BASILICON. (*Green.*) *Syn.* Ung. Basilicum Viride. *Prep.* (P. L. 1746.) Powdered verdigris 1 oz.; olive oil ℥iij; resin ointment ℥viij; mix. Detergent; used to keep down fungous flesh.

OINTMENT, BELLADONNA. *Syn.* Ung. Belladonnæ. *Prep.* (Pereira.) Extract of deadly nightshade ʒj to ʒij; lard ℥j; mix. To allay pain and nervous irritation.

OINTMENT, BELLADONNA. (*Comp.*) Iodine ointment (comp.) ʒvij; extract of belladonna ʒj; mix. Dispersive. A most excellent application to all glandular swellings, especially when accompanied with pain. The mixture of chloride of gold should also be taken at the same time. See Mixture, Antiscrofulous.

OINTMENT, BICHLORIDE OF MERCURY. *Syn.* Ung. Hydrargyri Muriatis. *Prep.* I. (P. C.) Corrosive sublimate 10 grs.; yelk of 1 egg; lard ℥j; mix.

II. Corrosive sublimate ℈j to ʒss; lard ℥j; mix.

OINTMENT, BINIODIDE OF MERCURY. *Syn.* Pommade de Deuto-Iodure de Mercure. Ung. Hydrargyri Biniodidi. *Prep.* (P. L.) Biniodide of mercury ℥j; white wax ℥ij; lard ℥vj; mix well. Applied to ill-conditioned sores, scrofulous ulcers. &c.; and when diluted with lard or almond oil, to the eyes in like cases.

OINTMENT, BINOXIDE OF MERCURY. *Syn.* Ung. Hydrargyri Binoxydi. *Prep.* (Cazenave.) Binoxide of mercury ʒss; camphor 4 grs.; lard ℥j. (See Ointment, *Nitric Oxide of Mercury.*)

OINTMENT, BORAX. *Syn.* Ung. Boracis. *Prep.* Borax ʒj; spermaceti ointment ʒvij. For excoriations, chaps, &c.

OINTMENT, BLISTERING. *Syn.* Ung. Epipasticum Equinum. *Prep.* I. Lard or tallow 5½ lbs.; powdered euphorbium ¾ lb.; powdered cantharides 1½ lb.; *finely*-powdered corrosive sublimate 6 oz.; linseed oil 1¾ lb.; oil of origanum 3 oz.; mix well.

II. Cantharides 1 oz.; oil of turpentine 2 oz.; lard 8 oz.; mix.

III. Lard 6 oz.; oil of origanum 2 dr.; corrosive sublimate 1 dr., (dissolved in spirits of salt 2 dr.;) powdered flies 1 oz.; mix.

IV. Yellow basilicon ¾ lb.; oil of origanum ½ oz.; strong vinegar and linseed oil, of each 2 oz.; powdered flies 4 oz.; mix. All the above are used by farriers.

OINTMENT, BISMUTH. *Syn.* Ung. Bismuthi. *Prep.* (Pereira.) Trisnitrate of bismuth ʒj; simple ointment ʒiv; mix. Used in some chronic skin diseases.

OINTMENT, BROMIDE OF POTASSIUM. *Syn.* Ung. Potassii Bromidi. *Prep.* (Majendie.) Bromide of potassium ʒss; lard ℥j; mix.

OINTMENT, BROMINE. *Syn.* Ung. Potassii Bromidi cum Brominio. *Prep.* (Majendie.) Bromide of potassium ℈j; lard ℥j; bromine 6 to 12 drops; mix well. Both the above are resolvent. Used in bronchocele, scrofula, &c.

OINTMENT, BROWN. *Syn.* Ung. Fuscum. *Prep.* (P. Cod.) Resin ointment ℥ij; levigated red precipitate ʒj; mix. An excellent application in ophthalmia after the inflammatory stage is over, and to sore legs, &c.

OINTMENT, CADMIUM. *Syn.* Ung. Cadmii. *Prep.* (Rudius.) Sulphate of cadmium 1 to 2 grs.; lard ʒj; mix. For removing specks from the cornea, &c.

OINTMENT, CALAMINE. *Syn.* Turner's Cerate. Ung. Calaminæ, (P. D.) Ung. Zinci Carbonatis Impuri. *Prep.* (P. D.) Prepared calamine lb. j; ointment of yellow wax lb. v; mix. (See Cerate, Calamine.)

OINTMENT, CALOMEL. *Syn.* Ung. Calomelanus. Ung. Hydrargyri Chloridi. *Prep.* (Guy's H.) Calomel ʒj; lard ℥j; mix. Dr. Underwood uses elder-flower ointment. "Were I required to name a local agent pre-eminently useful in skin diseases generally, I should fix on this. It is well deserving a place in the Pharmacopœia." (Pereira.)

OINTMENT, CAMPHOR. *Syn.* Ung. Camphoræ. Ceratum do. *Prep.* Spermaceti ointment ℥j; camphor ʒij; dissolve by a *gentle* heat, and stir till cold. *Used* in psoriasis, &c.

OINTMENT, CANTHARIDES. *Prep.* I. (*Ung. Cantharidis*, P. E.) Resinous ointment ℥vij; cantharides in fine powder ℥j; mix. (See Cerate, Blistering.)

II. (*Ung. Cantharidis*, P. L. *Ung. Infusi Cantharidis*, P. E.) Powdered cantharides ℥j; water ℥iv; boil to one-half, strain, add resin cerate ℥iv, and evaporate to a proper consistence. This ointment is milder, and usually preferred to the preceding. Both are used to keep blisters open, and to stimulate indolent ulcers.

III. (Dupuytren.) Tincture of cantharides (made with flies 1, to proof spirit 8) ʒj; lard ʒix; mix well. Used as a pommade to make the hair grow, for which purpose it may be colored or scented at pleasure.

IV. (M. Cap.) Beef marrow ℥ij; alcoholic extract of cantharides 8 grs.; rose oil ʒj; essence of lemons 40 drops; mix. For the hair.

OINTMENT, CARBONATE OF LEAD. *Syn.* White Ointment. Ung. Album. Ung. Plumbi Carbonatis, (P. E. & D.) *Prep.* (P. E.) Carbonate of lead ℥j; simple ointment ℥v; mix. Used in excoriations. The *ung. album camphoratum*, P. L. 1745, (Ung. plumbi camph.,) is made by adding to the above camphor ʒj.

OINTMENT, CATECHU. *Syn.* Ung. Catechu. *Prep.* Finely powdered catechu and yellow rosin, of each ℥iv; alum ʒix; olive oil ℥x; water q. s.; mix. An excellent application to ulcers in hot climates, where the ordinary fat ointments are found objectionable.

OINTMENT, CHLORIDE OF CALCIUM. *Syn.* Ung. Calcis Muriatis. *Prep.* (Sundelin.) Muriate of lime (dry) ʒj; powdered digitalis ʒij; distilled vinegar ℈ij; lard ℥j; mix. In bronchocele, scrofula, &c.

OINTMENT, CHLORIDE OF LIME. *Syn.* Ung. Calcis Hypochloritis. *Prep.* (Cima.) Chloride of zinc ʒj; lard ℥j; mix. For itch, putrid sores, &c.

OINTMENT, CHLORIDE OF GOLD AND SODA. *Syn.* Pommade de Muriate d'Or et de Soude. Ung. Auri Sodio-Chloridi. *Prep.* (Majendie.) Sodio-chloride of gold 10 grs.; lard ʒiv; mix. In scrofulous and syphilitic swellings, ulcers, &c.

OINTMENT, CHLORINE. *Syn.* Ung. Chlorinatum. *Prep.* Chlorine water ℥j; lard ℥iv; mix. Used for itch, fetid ulcers, &c.

OINTMENT, COCCULUS INDICUS. *Syn.* Ung. Cocculi. *Prep.* (P. E.) Kernels of cocculus indicus 1 part; beat to a paste, then add lard 5 parts. Used to destroy insects in children's hair, and in porrigo.

OINTMENT, COD'S OIL. *Syn.* Ung. Olei Aselli. *Prep.* (M. Carron.) Cod's liver oil and extract of smoke, of each, ʒij; nitrated ointment of mercury ʒj; beef marrow ℥vj; mix. In tinea favosa, impetigo, and chronic eczema and ophthalmia.

OINTMENT, COLOCYNTH. *Syn.* Ung. Colocynthidis. *Prep.* (Chrestien.) Powdered colocynth ʒj; lard ℥j; mix. Used in frictions on the abdomen, and insides of the thighs, in mania, &c. Diuretic.

OINTMENT, COSMETIC. *Syn.* Ung. Cosmeticum. Pommade de la Jeunesse. *Prep.* (Quincey.) Almond oil ℥ij; spermaceti ʒiij; trisnitrate of bismuth ʒj; oil of rhodium 6 drops. Turns the hair black.

OINTMENT, CREOSOTE. *Syn.* Ung. Creasoti, (P. L.) Ung. Creazoti, (P. I.) *Prep.* (P. L.) Creosote fʒss; lard ℥j; mix. In skin diseases, especially ringworm; also a good application to burns and chilblains.

OINTMENT, CROTON. *Syn.* Ung. Crotonis. *Prep.* (Ainslie.) Croton oil 10 drops; lard ʒss; mix. Counter-irritant; rubbed repeatedly on the skin, it produces redness and a pustular eruption.

OINTMENT, CYANIDE OF MERCURY. *Syn.* Ung. Hydrargyri Cyanidi. *Prep.* 1. (Rayer.) Cyanide of mercury (bicyanide) 30 grs.; lard ℥j; mix.—2. (Pereira and Biett.) 10 to 12 grs. to the oz. In scrofula, &c.

OINTMENT, CYANIDE OF POTASSIUM. *Syn.* Ung. Potassii Cyanidi. *Prep.* (Lombard.) Cyanide of potassium 2 to 4 grs.; lard ℥j; mix.

OINTMENT, DELPHINE. *Syn.* Ung. Delphiniæ. *Prep.* (Turnbull.) Delphine 10 to 30 grs.; olive oil ʒj; rub together, then add lard ℥j; mix well. In neuralgia, rheumatic affections, inveterate itch, &c.

OINTMENT, DEPILATORY. *Syn.* Linimentum Depilatorium. *Prep.* Finely powdered quicklime ℥j; do. orpiment ʒj; white of egg to mix.

OINTMENT, DESICCATIVE. *Syn.* Ung. Desiccativum. *Prep.* (Jondelotte.) Simple ointment ℥xvj; colcothar, lapis calaminaris, and white lead, of each, ℥j; camphor ʒij; mix. Drying, cicatrizing.

OINTMENT, DETERGENT. *Syn.* Ung. Detergens. *Prep.* Yellow basilicon 2 lbs.; Venice turpentine 4 oz.; red precipitate, verdigris, and euphorbium, of each, ½ oz.; mix well.

OINTMENT, DIGESTIVE. *Syn.* Ung. Digestivum. *Prep.* I. (P. Cod.) Venice turpentine ℥ij; yelks of 2 eggs; oil of St. John's wort ℥ss; mix. With an equal quantity of mercurial ointment, the above forms *digestif mercuriel;* and with liquid storax, *digestif animé.*

II. (*Ung. Digest. Viride,* Kirkland.) Yellow resin, beeswax, and elemi, of each, ℥j; green oil ℥vj; melt together, and when nearly cold, add oil of turpentine ʒij.

III. (*For horses.*)—*a.* Lard, yellow basilicon, and Venice turpentine, of each, 5 oz.; finely powdered verdigris 2 oz.; mix.—*b.* Yellow basilicon 15 oz.; red precipitate 1 oz.; mix.

OINTMENT, DIGITALIS. *Syn.* Ung. Digitalis. *Prep.* Foxglove leaves lb. ij; lard lb. iiss; boil till crisp, and strain with pressure.

OINTMENT, EDINBURGH. *Prep.* Black basilicon 3 lbs.; milk of sulphur 2 lbs.; mix. Used for itch. Collier says that this ointment is the same as the ung. veratri of the P. L., with the addition of a little sal ammoniac.

OINTMENT, ELDER, (FLOWERS.) *Syn.* Ung. Sambuci. *Prep.* (P. L.) Elder flowers and lard, of each, lb. ij; boil until crisp, then strain through a cloth. Emollient. A much better ointment may with proper care be prepared from the distilled water, and this is generally done on the large scale. The following formula is commonly used:—Lard, (hard, white, and sweet,) 25 lbs.; prepared mutton suet 5 lbs.; melt in a well-tinned or earthen vessel, add elder-flower water 3 gallons; agitate for half an hour, and set it aside; the next day gently pour off the water, remelt the ointment, add benzoic acid 3 dr.; otto of roses 20 drops; essence of bergamotte and oil of rosemary, of each, 30 drops; again agitate well, let it settle for 10 minutes, and then pour off the clear into pots. Very fine, and keeps well.

OINTMENT, ELDER, (LEAVES.) *Syn.* Green Ointment. Ung. Viride. Ung. Sambuci. Ung. Samb. Viride. *Prep.* I. (P. L. 1746.) Green oil lb. iij; wax ℥x; melt, and stir till cold. Does not grain.

II. Lard 1 cwt.; prepared suet 14 lbs.; fresh elder leaves 56 lbs.; boil till crisp, strain off the oil, put it over a slow fire, and gently stir it till it acquires a bright green color.

III. Leaves lb. iij; lard lb. iiij; suet lb. ij. Both the above are emollient and cooling. The last two formulæ are those employed in the wholesale trade. The ointment should be allowed to cool slowly, with very little stirring, that it may "*grain*" well, as a granular appearance is much admired. It is a common practice to add pow-

dered verdigris to deepen the color, but then the ointment does not keep well.

OINTMENT, ELEMI. *Syn.* Ung. Elemi, (P. L.) Linimentum Arcæi. Ung. do. Do. do. comp. *Prep.* (P. L.) Gum elemi lb. j; suet lb. ij; melt together, then add common turpentine ℥x; olive oil f℥ij; mix, and strain. Stimulant and digestive. Used to old and ill-conditioned sores. The *ung. elemi cum ærugine* of St. George's Hospital is made by adding finely powdered verdigris ʒj, to every lb. ss of the above.

OINTMENT, ESCHAROTIC. *Syn.* Ung. Escharoticum. *Prep.* (Sir B. Brodie.) Finely levigated verdigris, sulphate of copper, and nitric oxide of mercury, of each ʒij; corrosive sublimate ʒj; lard q. s.

OINTMENT, EYE. *Syn.* Eye-salve. Ung. Ophthalmicum. *Prep.* I. (Dupuytren's.) Red oxide of mercury 10 grs.; sulphate of zinc 20 grs.; lard ℥ij; mix. For chronic inflammation of the eyelids, &c.

II. (Dessault's.) Red precipitate, carbonate of zinc, acetate of lead, and dried alum, of each ʒj; bichloride of mercury ℈j; rose ointment ℥j; mix. Mostly used diluted with some lard. In chronic ophthalmia, profuse discharges, &c.

III. (Spielmann's.) Acetate of lead ℈j; spermaceti cerate ʒv; tincture of benzoin (comp.) ℈ij; mix. Cooling. In inflammation, excoriations, &c.

IV. (St. Yve's.) Red precipitate ʒss; oxide of zinc ℈j; fresh butter ℥j; wax ℈iv; camphor 15 grs. As No. I.

V. (Pellier's.) Red precipitate, and carbonate of zinc, of each ʒiss; tutty ʒss; red sulphuret of mercury ℈j; balsam of Peru 15 drops; lard ℥ij. In speck of the eye, arising from small ulcers that have healed up.

VI. (Janin's.) Tutty, and levigated bole, of each ʒij; white precipitate ʒj; lard ℥ss. In chronic inflammation, with excessive secretion, &c.

VII. (Fricke's.) Nitrate of silver 10 grs.; balsam of Peru ʒss; zinc ointment ʒij. In ulcers of the cornea, acute, purulent, and chronic ophthalmia, &c.

VIII. (Guthrie's.) Spermaceti ointment ʒj; solution of diacetate of lead 15 drops; nitrate of silver 2 to 10 grs.; mix. As last. Both this and the preceding often occasion great pain.

IX. (Singleton's *Golden.*) Orpiment ʒj; lard q. s.

X. (Smellome's.) Verdigris ʒss; olive oil 30 drops; yellow basilicon ℥j; mix. In inflammation of the eyelids, &c.

XI. (Collier's.) Dried alum ʒss; powdered opium ℈j; olive oil fʒj; spermaceti ointment ʒij; mix. For inflammation of the eyelids, purulent ophthalmia, &c.

Remarks. All the above ointments should be used in very small quantities at a time, and carefully applied with a camel hair pencil or a feather, and not till acute inflammation has subsided. The ingredients entering into their composition should be reduced to the state of very fine powder before mixing, and the incorporation should be made by long trituration in a Wedgewood-ware mortar, or preferably, for those that contain substances that are very gritty, by levigation on a porphyry slab, with a muller.

OINTMENTS, FLOWER OF. *Syn.* Flos Unguentorum. *Prep.* Resin, thuris, wax, and suet, of each lb. ss; olibanum, and Venice turpentine, of each ℥iss; myrrh ℥j; wine ½ pint; boil together, and add camphor ʒij. Suppurative, warm.

OINTMENT OF GALLS. *Syn.* Ung. Gallarum. Ung. Gallæ. *Prep.* (P. D.) Galls in very fine powder ℥j; lard ℥iv; mix. An excellent application to piles, either alone or mixed with an equal quantity of zinc ointment.

OINTMENT OF GALLS, (COMPOUND.) *Syn.* Ung. Gallæ compositum, (P. L.) Ung. Gallæ et Opii, (P. E.) *Prep.* (P. L.) Galls finely powdered ʒij; powdered opium ʒss, (ʒj, P. E.;) lard ℥ij, (℥j, P. E.;) mix. Anodyne, astringent. An excellent application to blind piles, and prolapsus ani. Some persons add camphor ʒj.

OINTMENT, GALLS AND MORPHIA. *Syn.* Ung. Gallæ cum Morphia. *Prep.* (Paris.) Morphia 2 grs.; olive oil fʒij; triturate, and add finely powdered galls ʒj; zinc ointment ℥j. In piles, to allay pain.

OINTMENT, GOLD. *Syn.* Pommade d'Or. Ung. Auri. *Prep.* I. (Legrand.) Powdered gold 12 grs.; lard ℥j; mix. For frictions.

II. (Majendie.) Amalgam of gold ʒj; lard ℥j. For endermic use. (See Gold.)

OINTMENT, HELLEBORE. *Syn.* Ung. Veratri, (P. L. & D.) Ung. Hellebori albi. *Prep.* (P. L.) Powdered white hellebore ℥ij: lard ℥viij; oil of lemons 20 drops; mix. In itch, lepra, ringworm, &c.; and to destroy insects in the hair of children. It should be used with caution.

OINTMENT, HELLEBORE, (COMPOUND.) *Prep.* (Rayer.) White hellebore ℥j; sal ammoniac ʒiv; lard ℥viij; mix.

OINTMENT, HEMLOCK. *Syn.* Ung. Conii. *Prep.* (P. D.) Fresh leaves of hemlock, and lard, equal parts; boil till crisp, and strain with pressure through linen. For glandular and scirrhous swellings, painful piles, cancerous sores, &c.

OINTMENT, HENBANE. *Syn.* Ung. Hyoscyami. *Prep.* As the last. As a sedative and anodyne application to painful swellings and piles, and irritable ulcers; and in neuralgic pains, &c.

OINTMENT FOR HORSES. *Prep.* I. (*For canker.*) Tar 8 oz.; lard 4 oz.; oil of vitriol, or verdigris, 1 oz.

II. (*For fistula.*)—*a.* Yellow basilicon 8 oz.; oil of turpentine and verdigris, of each 1 oz.; mix.—*b.* Ointment of nitrate of mercury 4 oz.; oil of turpentine, and lard, of each 1 oz.; mix.

III. (*For grease.*) Lard 4 oz.; white lead 1 oz.; mix.

IV. (*For cracked hoofs.*) Tar and tallow equal parts, melted together.

V. (*Heel ointment.*) To the last add verdigris 2 oz. to each pound.

VI. (*For foot rot.*) Lard and Venice turpentine, of each 4 oz.; melt, and add blue vitriol 1 oz. For horses, cows, or sheep.

VII. (*For mange.*)—*a.* Lard and sulphur vivum, of each 4 oz.; yellow basilicon, and oil of turpentine, of each 3 oz.; mix.—*b.* To the last add tar and suet, of each 4 oz.—*c.* Soft soap, oil of turpentine, lard, and flowers of sulphur, of each 4 oz.; mix.

OINTMENT, HYPOCHLORIDE OF SUL-

PHUR. *Syn.* Ung. Sulphuris Hypochloridi. *Prep.* (Copland.) Hypochloride of sulphur ℨj; lard ℥j.

OINTMENT, HYDRIODATE OF AMMONIA. *Syn.* Ung. Ammoniæ Hydriodatis. *Prep.* (Ellis.) Hydriodate of ammonia ℈j; lard ℥j; mix.

OINTMENT, IODATE OF ZINC. *Syn.* Ung. Zinci Iodatis. Pommade avec l'Iodate de Zinc. *Prep.* Iodate of zinc ℨj; lard ℥j; mix. Used in scrofula, &c.

OINTMENT, IODIDE OF BARIUM. *Syn.* Ung. Barii Iodidi. *Prep.* (Majendie.) Iodide of barium 4 grs.; lard ℥j.

OINTMENT, IODIDE OF LEAD. *Syn.* Ung. Plumbi Iodidi. *Prep.* (P. L.) Iodide of lead ℥j; lard ℥viij; mix. Applied by friction to scrofulous and other indolent glandular swellings.

OINTMENT, IODIDE OF MERCURY. *Syn.* Pommade de proto-iodure de Mercure. Ung. Hydrargyri Iodidi. *Prep.* (P. L.) White wax ℥ij; lard ℥vj; melt, and when nearly cold triturate with iodide of mercury ℥j. Used in tubercular skin diseases, and as a dressing for ill-conditioned sores, scrofulous ulcers, &c.; it should be used with caution.

OINTMENT, IODIDE OF POTASSIUM. *Syn.* Pommade avec l'Hydriodate de Potasse. Ung. Potassæ Hydriodatis. *Prep.* (Majendie.) Iodide of potassium ℨj; lard ℨxij; mix. In scrofula, bronchocele, glandular swellings, &c.

OINTMENT, IODINE. *Syn.* Ung. Iodinii. *Prep.* (P. D.) Iodine ℈j; lard ℥j; mix. For scrofulous sores, glandular swellings, &c.; either alone, or mixed with lard.

OINTMENT, IODINE, (COMPOUND.) *Syn.* Pommade d'Hydriodate Iodure de Potasse. Ointment of Ioduretted Iodide of Potassium. Ung. Iodinii compositum, (P. L.) Ung. Iodinei, (P. E.) *Prep.* (P. L.) Iodine ℨss; iodide of potassium ℨj; rectified spirit f ℨj; triturate together, then add lard ℥ij. In glandular enlargements. &c.: stronger than the simple ointment.

OINTMENT, IODOHYDRARGYRATE OF IODIDE OF POTASSIUM. *Syn.* Ung. Iodohydrargyrat's Potassii Iodidi. *Prep.* (Puche.) Biniodide of mercury, and iodide of potassium, of each - grs.; lard ℥j.

OINTMENT ITCH. *Syn.* Ung. Antipsoricum. *Prep* I. (De La Harpe.) Flowers of sulphur ℥ij; sulphate of zinc ℨij; powdered hellebore ℨiv; soft soap ℥iv; lard ℥viij; mix.

II. (Bateman's.) See page 100.

III. (Bailey's.) See page 88.

IV. (Jackson's.) Lard, palm oil, flowers of sulphur, and white hellebore, equal parts.

V. (*Common.*) Palm oil 1 lb.; lard 5 lbs.; white lead ½ lb.; corrosive sublimate 4 oz.; mix well.

OINTMENT, LARD. *Syn.* Ung. Adipis. Lard washed with rose water.

OINTMENT, LAUREL. *Syn.* Ung. Larinum vulgare. Common Oil of Bays. *Prep.* Laurel leaves 1 lb.; laurel berries ½ lb.; cabbage leaves 4 oz.; neats' foot oil 5 lbs.; suet 2 lbs.; boil, express, and cool slowly, to let it "*grain.*"

OINTMENT, LEAD. *Syn.* Ung. Lythargyri Acetati. *Prep.* (P. C.) Wax ointment ℥j; solution of diacetate of lead ℨss.

OINTMENT, LEAD, (COMPOUND.) *Syn.* Higgin's Neutral Ointment. Kirkland's Neutral Cerate. Ung. Plumbi compositum. *Prep* (P. L.) Prepared chalk ℥viij; distilled vinegar f ℥vj; mix, and when the effervescence ceases, add lead plaster lb. iij, previously melted with olive oil 1 pint, and stir till cold. Used as a dressing to indolent ulcers. See Cerate, Kirkland's.

OINTMENT, LEAD AND MORPHIA. *Syn.* Ung. Plumbi cum Morphia. *Prep.* (Geddings.) Carbonate of lead ℥ss; sulphate of morphia 15 grs.; stramonium ointment ℥j; olive oil q. s.

OINTMENT, LE MORT'S. Lard 7 oz.; Venice turpentine, litharge, corrosive sublimate, and carbonate of lead, of each 1 oz.; alum 3 dr.; vermilion to color.

OINTMENT, LUPULINE. *Syn.* Ung. Lupulinæ. *Prep.* (Freake.) Lupulina ℨj; lard ℨiij. To relieve cancerous pains. The *Ointment of Hops* (Ung. Lupuli, Van Mons) is made with hops ℥ij; lard ℥x; in the same way as ointment of belladonna.

OINTMENT, MANGANESE. *Syn.* Ung. Manganesii Binoxydi. *Prep.* Black oxide of manganese ℨj; lard ℥j. For scrofulous swellings, itch, scaldhead, &c.

OINTMENT, MERCURIAL. *Syn.* Unction. Blue Ointment. Neapolitan do. Strong Mercurial do. Ung. Cæruleum. Ung. Hydrargyri, (P. E. & D.) Ung. Hyd. Fortius, (P. L.) *Prep.* I. (P. L. & E.) Suet ℥j; mercury lb. ij; lard ℥xxiij; triturate the metal with the suet and a little of the lard, till the globules are extinguished, then mix in the remainder of the lard.

Remarks. The Dublin College orders equal parts of mercury and lard. The stronger mercurial ointment of the shops is usually made with less mercury, and the color is brought up with finely-ground blue black, or wood charcoal. This fraud may be detected by the decrease in the sp. gr., and by a portion being left undissolved when a little of the ointment is treated, first with ether to remove the fat, and then with dilute nitric acid to remove the mercury. The following is the form which is very generally substituted for that of the pharmacopœia:—mercury 12 lbs.; suet 1½ lb.; lard 16½ lbs. The Ung. Hydrargyri partes æquales of the shops is usually made of mercury and lard, of each 12 lbs.; suet 1½ lb. ⁂ Mercurial ointment "is not well prepared so long as metallic globules may be seen in it with a magnifier of 4 powers." (P. E.) Its sp. gr. should not be less than 1·781, at 60°. When rubbed on a piece of bright copper or gold, it should immediately give it a coating of metallic mercury. This ointment is chiefly used to introduce mercury into the system, when the stomach will not bear it. ½ to 1 dr. is commonly rubbed into the inside of the thigh night and morning. (See Sevum.)

II. (*Mild Mercurial Ointment. Ung. Hyd. Mitius*, P. L. & D.) Stronger mercurial ointment lb. j; lard lb. ij; mix. Used in cutaneous diseases, as a dressing to ulcers, and to kill insects on the body. The ointment of the shops usually contains only half the above quantity of mercury.

III. (Donovan.) Gray oxide of mercury ℈j; lard ℥j; heat them to 350° for 2 hours, constantly stirring. Gray colored. It may also be made from the red oxide in the same way, by keeping the

ointment heated to about 300° for some hours. Cleaner and stronger than *Ung. Hyd. Fort.* P. L.

IV. (Tyson.) Black oxide of mercury (prepared by decomposing precipitated calomel with liquors of potassa and ammonia) ℥ij; lard lb. j; mix. About as active as the last.

OINTMENT, MACE. *Syn.* Ung. Macis. Common Oil of Mace. *Prep.* Mace and palm oil, of each 1 lb.; beat to a paste, and add melted beef marrow 3 lbs.

OINTMENT, MEZEREON. *Syn.* Ung. Mezerei. *Prep.* (P. Cod.) Mezereon bark ℥iv, (bruised and moistened with spirit;) white wax ℥iss; lard ℥xivss; digest at 212° for 12 hours, press and strain.

OINTMENT, NERVINE. *Syn.* Ung. Nervinum. Balsamum do. Baume's Nerval. *Prep.* (P. Cod.) Expressed oil of mace, and ox-marrow, of each ℥iv; melt, and add oil of rosemary ʒij; camphor and oil of cloves ʒj; balsam of tolu ʒij, dissolved in rectified spirit ʒiv.

OINTMENT, NITRATE OF MERCURY. *Syn.* Citrine Ointment. Yellow do. Mercurial Balsam. Ung. Citrinum, (P. E. & D.) Ung. Hydrargyri nitratis, (P. L.) *Prep.* Dissolve mercury ℥j in nitric acid sp. gr. 1·5 fʒxj; and add the solution to lard ℥vj and olive oil f℥iv, melted in a capacious Wedgewood-ware, or well-glazed earthen vessel, placed in a water-bath, at a temperature of from 180 to 200° Fahr.; mix well, remove the heat, and stir till the mixture ceases to evolve gas, and acquires a considerable degree of consistence.

Remarks. The above are the proportions of the P. L.;—the P. E. orders nitric acid (1·5) f℥viij, fʒvj; mercury ℥iv; lard ℥xv; olive oil f℥xxxij;—the P. D. orders mercury ℥j; acid ʒxj; lard ℥iv olive oil 1 wine pint;—the P. U. S. orders mercury ℥j; acid ʒxj; lard ℥iij; neats' foot oil f℥ix;—the P. Cod. orders mercury 30 parts; acid (sp. gr. 1·321) 60 parts; lard and olive oil, of each 240 parts. Good citrine ointment may be procured from any of the above formulæ by proper management. The great art consists in employing pure ingredients, and mixing them at the proper temperature. The acid should be of the full strength, or if weaker, an equivalent quantity should be employed. This may be ascertained from the table of the sp. gr. of nitric acid, page 442. If the mixture do not froth up, the heat should be increased a little, as without a violent frothing and reaction take place, the ointment will not turn out of good quality, but will rapidly harden. This is the whole difficulty of the process, and it is surprising that the preparation of this ointment, which is not at all difficult, should have so long engaged the attention of the pharmaceutical periodicals. The London form produces a most beautiful golden colored ointment, having a buttery consistence, and keeps well, but more acid may be used with advantage.

Use. In ringworm, and various chronic skin diseases; as a dressing to ulcers, and in various diseases of the eyes, especially chronic inflammation of the eyelids, &c. For most purposes, particularly the latter, it must be largely diluted with lard or oil.

⁂ This ointment, made with 3 times the above weights of lard and oil, forms the *milder citrine ointment,* (Ung. Hydrargyri Nitratis mitius.) The best substance to dilute the stronger ointment, is fresh butter, or palm, poppy, or almond oil.

OINTMENT, NITRATE OF SILVER. *Syn.* Ung. Argenti nitratis. *Prep.* 1. (Velpeau.) Nitrate of silver 1 gr.; lard ʒj.—2. (Mackenzie.) Nitrate of silver 5 grs.; lard ℥j. In purulent and chronic ophthalmia, ulcers on the cornea, &c. It should be used with great caution.

OINTMENT, NITRIC OXIDE OF MERCURY. *Syn.* Red precipitate Ointment. Ung. Hydrargyri nitrico-oxydi, (P. L.) Ung. Hyd. oxydi, (P. E.) Do. do. do. nitrici, (P. D.) Do. do. do. rubri. Ung. Hyd subnitratis. *Prep.* (P. L.) Finely-powdered nitric oxide of mercury ℥j; white wax ℥ij; lard ℥vj; melt, and stir in the oxide. The P. E. orders ℥viij of lard instead of the wax and lard above. As a stimulant application to indolent sores and ulcers, to inflamed eyes, &c.

OINTMENT, NITRIC ACID. *Syn.* Oxygenized Lard. Pommade d'Alyon. Ung. acidi nitrici. Do. do. nitrosi. *Prep.* (P. D.) Olive oil lb. j; lard ℥iv; melt together, and add nitric acid (sp. gr. 1·5) fʒvss; stir till stiff. This ointment has a yellow color, and is frequently sold for ointment of nitrate of mercury, but the fraud may be detected by its not turning gray when kept heated for some time. Stimulant; used to dress foul ulcers.

OINTMENT, OBSTETRIC. *Syn.* Ung. obstetricum. Pommade obstetricale. *Prep.* (Chaussier.)—1. Extract of belladonna ʒij; water and lard, of each ℥ij; mix. For dilating the uterus.—2. (*Pommade pour le toucher.*) Yellow wax, and spermaceti, of each ℥j; olive oil ℥xvj; melt, strain, add solution of pure soda f℥j, and stir till cold.

OINTMENT, OPIUM. *Syn.* Ung. Opiatum. Ung. opii. *Prep.*—1. Powdered opium ʒj; spermaceti ointment ℥iij; mix. To allay pain.—2. (Augustin.) Opium ʒij; ox gall ℥ij; digest 2 days, strain, and add lard ℥ij; essence of bergamot 10 drops.—3. (Brera.) Opium ʒj; gastric juice of a calf q. s.; digest 24 hours, and add lard ℥j, or q. s.

OINTMENT, OXIDE OF LEAD. *Syn.* Ung. Lythargyri. Ung. nutritum. *Prep.* (P. Cod.) Litharge ℥iij; vinegar ℥iv; olive oil ℥ix; heat gently, and stir till they combine.

OINTMENT, OXIDE OF MERCURY. *Syn.* Ung. Hydrargyri oxidi. Do. do. do. cinerei. *Prep.* Protoxide of mercury ℥j; lard ℥iij; mix. Substituted for mercurial ointment. (See Donovan's and Tyson's Mercurial Ointments.)

OINTMENT, OXIDE OF SILVER. *Syn.* Ung. Argenti oxydi. *Prep.* (Serre.) Oxide of silver 16 grs.; lard ℥j; mix. For scrofulous and syphilitic sores, &c.

OINTMENT, OXIDE OF ZINC. *Syn.* Ung. Zinci, (P. L. & E.) Ung. Zinci oxydi, (P. D.) *Prep.* (P. L.) Oxide of zinc ℥j; lard ℥vj; mix. Desiccative; in various skin diseases attended with profuse discharges, in burns, blisters, excoriations, &c., and in chronic inflammations of the eye. The ointment of crude oxide of zinc (*Ung. Tutiæ, Ung. Zinci Oxydi impuri*) is made of prepared tutty 1 part; lard 5 parts.

OINTMENT, PHOSPHORUS. *Syn.* Ung. Phosphoratum. *Prep.* (P. Cod.) Phosphorus ʒj;

ard ℥vj ʒiij; mix in a bottle, melt in a water-bath, and shake till cold.

OINTMENT, PHOSPHORIC ACID. *Syn.* Ung. Acidi Phosphorici. *Prep.* (Soubeiran.) Phosphoric acid ʒj; lard ℥j; mix. In caries of the bones, &c.

OINTMENT, PEPPER. *Syn.* Pepper Salve. Ung. Piperis nigri. *Prep.* (P. D.) Finely-powdered black pepper ℥iv; lard lb. j; mix. Stimulant; irritant; used in ringworm, &c.

OINTMENT, PITCH. *Syn.* Black Basilicon. Ung. Tetrapharmacum. Ung. Basilicum nigrum. Ung. Picis nigræ, (P. L.) *Prep.* Black pitch, wax, and resin, of each, ℥ix; olive oil f℥xvj; melt together, and stir till cold. Stimulant and digestive; used in eruptions, scald-head, &c.

OINTMENT, PITCH, (COMPOUND.) *Prep.*—1. (*Ung. Picis compositum*, St. B. H.) Pitch ointment and ointment of acetate of lead, equal parts. Stimulant and desiccant.—2. (*Ung. Picis cum Sulphure*, Guy's H.) Tar lb. ss; wax ℥ss, (℥j;) flowers of sulphur ℥ij; mix. In itch, psoriasis, and other scaly skin diseases, ringworm, &c.

OINTMENT, PICROTOXINE. *Syn.* Ung. Picrotoxinæ. *Prep.* (Jager.) Picrotoxine 10 grs.; lard ℥j; mix. In obstinate porrigo, (ringworm;) and diluted with olive oil, to destroy vermin on the body.

OINTMENT FOR PILES. *Syn.* Ung. Hæmorrhoidale. *Prep.* I. (Dr. Gedding.) Carbonate of lead ʒiv; sulphate of morphia 15 grs.; stramonium ointment ℥j; olive oil q. s. To allay pain and inflammation.

II. Spermaceti ointment 8 oz.; powdered galls 1 oz.; do. opium 1 dr.; solution of diacetate of lead 1½ oz. (See Piles.)

OINTMENT, PLATINUM. *Syn.* Ung. Platini. *Prep.* (Haefer.) Perchloride of platinum ʒj; extract of belladonna ʒij; lard ℥iv; mix.

OINTMENT, POMATUM. *Syn.* Ung. Pomatum, (P. L. 1746.) White Lip Salve. Lard washed with rose water.

OINTMENT, POPLAR BUDS. *Syn.* Ung. Populeum. *Prep.* Bruised poplar buds 1 part; lard 3 parts; boil and strain. The old *Ung. Populeum* consisted of a number of green herbs boiled as above. Emollient and stimulant.

OINTMENT, POPLAR BUDS, (COMPOUND.) *Prep.* (P. Cod.) Bruised poplar buds ℥xij; fresh leaves of poppies, henbane, belladonna, and common nightshade, of each, ℥viij; lard lb. ivss. As last.

OINTMENT, PLUNKET'S. *Prep.* Crowsfoot 1 handful; dog's fennel 3 sprigs; pound well, add flowers of sulphur and white arsenic, of each, 3 thimblefuls; beat well together, form into boluses, and dry in the sun; then powder them; and for use mix with yolk of egg, spread a *little* on a small piece of pig's bladder, (size of half a crown,) and apply to the sore, and allow it to remain till it falls off by itself. In cancer: *poisonous;* requires great caution.

OINTMENT, QUININE. *Syn.* Ung. Quininæ fortius. *Prep.* Sulphate of quinine ʒj; lard ℥ij; mix. Rubbed into the axilla, to cure the ague of children.

OINTMENT, RED SULPHURET OF MERCURY. *Syn.* Ung. Hydrargyri bisulphureti. *Prep.* (Collier.) Bisulphuret of mercury ʒiss; sal ammoniac ʒss; rose water fʒj; lard ℥ss; mix. In several skin diseases.

OINTMENT, RESIN. *Syn.* Yellow Basilicon. Ung. Resinosum, (P. E.) Ung. Resinæ albæ, (P. D.) *Prep.*—1. (P. E.) Yellow resin ℥v; beeswax ℥ij; lard ℥viij; melt, and stir till cold.—2. (P. D.) Yellow wax lb. j; white (yellow) resin lb. ij; lard lb. iv; as above.

OINTMENT, RINGWORM. *Syn.* Ung. Contra-tineam. *Prep.* 1.—Soda 6 parts; slaked lime 40 parts; lard 1200 parts; mix.—2. Lard and ointment of black pitch, of each, ℥ij; ointment of nitrate of mercury ℥j; mix. The hair must be cut off close, and the part washed clean before each application.

OINTMENT, ROSE. *Syn.* Rose Lip-salve. Ung. Rosatum. Ung. Adipis, (P. L. 1788.) *Prep.* (P. Cod.) Washed lard lb. ij; roses (centif.) lb. ij; bruise the leaves, melt with the lard, and in 2 days again melt, and press; add roses lb. ij, and repeat the process; lastly strain, press, and color with alkanet root, if required red.

OINTMENT, RUBEFACIENT. *Syn.* Ung. Rubefaciens. *Prep.* (Richard.) Finely-powdered cantharides and camphor, of each, ʒj; lard ℥j; mix.

OINTMENT, RUE. *Syn.* Ung. Rutæ. *Prep.* (Sp. Ph.) Leaves of rue, wormwood, and peppermint, of each, ℥ij; lard ℥xvj; boil and strain.

OINTMENT, SAVINE. *Syn.* Ung. Sabinæ. *Prep.* (P. D.) Fresh savine leaves lb. ss; lard lb. ij; boil till crisp, strain, and add beeswax lb. ss.

OINTMENT, SCROPHULARIA. *Syn.* Ung. Scrophulariæ. *Prep.* (P. D.) Green leaves of knotted-rooted fig-wort and lard, of each, lb. ij; prepared suet lb. j; boil till crisp, and strain with pressure. In ringworm, "burnt holes," and some other cutaneous affections.

OINTMENT, SIMPLE. *Syn.* Ointment of White Wax, simple Dressing. Ung. Simplex, (P. E.) Ung. Ceræ albæ, (P. D.) *Prep.*—1. (P. D.) Lard lb. iv; white wax lb. j; melt together, and stir till cold.—2. (P. E.) Olive oil f℥vss; white wax ℥ij; as last. A simple unguent. The *Ung. Simplex*, P. L. 1746, was lard washed with rose water. (See Cerate, Simple.)

OINTMENT, SPERMACETI. *Syn.* White Ointment. Ung. Album, (P. L. 1746.) Ung. Spermatis ceti. Ung. Cetacei, (P. L.) *Prep.* (P. L.) White wax ʒij; spermaceti ʒvj; olive oil f℥iij; melt together. The Ung. cetacei of the Dublin Pharmacopœia is made with white wax lb. ss; spermaceti lb. j; lard lb. iij; and in consistence resembles the spermaceti cerate, P. L. In trade, the Dublin form, with double the amount of lard, is commonly adopted. (See Cerates.)

OINTMENT, STAVESACRE. *Syn.* Ung. Staphisagriæ. *Prep.* (Swediaur.) Powdered stavesacre ℥j; lard ℥iij; melt together, digest 3 hours, and strain. In itch, and to destroy vermin on the body, (pediculi.) A similar ointment is used by farriers.

OINTMENT, STRAMONIUM. *Syn.* Ung. Stramonii. *Prep.*—1. (P. U. S.) Fresh thorn-apple leaves ℥ij; lard ℥v; digest as last, and strain.—2. (Pereira.) Powdered leaves ℥j; lard ℥iv; mix. Anodyne. Used to dress irritable ulcers, and as an application to painful piles.

OINTMENT, SUBSULPHATE OF MERCURY. *Syn.* UNG. HYDRARGYRI SUBSULPHATIS. *Prep.*—1. (Alibert.) Turpeth's mineral ʒij; lard ℥iv; mix.—2. (Biett.) Turpeth's mineral ʒj; sulphur ʒij; lard ℥ij; essence of lemon 15 drops. Used in some scaly skin diseases, &c.

OINTMENT, SULPHURIC ACID. *Syn.* UNG. ACIDI SULPHURICI. *Prep.* (P. D.) Sulphuric acid ʒj, (fʒss;) lard ℥j; mix. Stimulant; used in paralysis, hemorrhages, itch, &c.; more cleanly than the sulphur ointment. For children it is made with only ½ or ¼ as much acid.

OINTMENT, SULPHATE OF ZINC. *Syn.* UNG. ZINCI SULPHATIS. *Prep.* (Scarpa.) Sulphate of zinc ʒj; lard ℥j; mix. Astringent. In some chronic skin diseases.

OINTMENT, SULPHUR. *Syn.* UNG. SULPHURIS, (P. L. E. & D.) *Prep.* (P. L.) Sublimed sulphur ℥iij; lard ℥vj; essence of bergamotte 20 drops; mix. The P. E. and D. order 1 to 4, and omit the bergamotte. In itch, scald-head, and several other skin diseases.

OINTMENT, SULPHUR, (COMPOUND.) *Syn.* ITCH OINTMENT. UNG. SULPHURIS COMPOSITUM. *Prep.* (P. L.) Sulphur and soft soap, of each, ℥vj; white hellebore ℥ij; nitre ʒj; lard lb. iss; essence of bergamotte ʒss; mix. As the last, but stronger, and more irritating, though more efficacious.

OINTMENT, SULPHURET OF POTASSIUM. *Syn.* UNG. POTASSII SULPHURETI. *Prep.* (Alibert.) Subcarbonate of soda and sulphuret of potassium, of each, ʒiij; lard ℥ij; mix. In chronic skin diseases, especially itch, psoriasis, lepra, eczema, &c.

OINTMENT, TANNIN. *Syn.* UNG. TANNINI. *Prep.* (Richard.) Tannin ʒij; water fʒij; triturate together, and add lard ℥iss. Astringent. An excellent application to piles.

OINTMENT, TAR. *Syn.* UNG. PICIS LIQUIDÆ. (P. L. E. & D.) *Prep.* (P. L.) Tar and mutton suet equal parts; melt together, and stir till cold. As an application to scald-head, ringworm, foul ulcers, &c.

OINTMENT, TOBACCO. *Syn.* UNG. TABACI. *Prep.* (P. U. S.) Fresh tobacco leaves chopped small ℥j; lard lb. j; boil till crisp, and strain through linen. Used for irritable ulcers, ringworm, and other diseases of the skin. It should be used with caution.

OINTMENT, TRIPHARMIC. *Syn.* UNG. TRIPHARMACUM. *Prep.* (P. L. 1745) Lead plaster ℥iv; olive oil f℥iv; vinegar f℥j; melt, and stir till they combine. Cooling and desiccative.

OINTMENT, VERATRINE. *Syn.* UNG. VERATRINÆ. POMMADE DE VERATRINE. *Prep.*—1. (Turnbull.) Veratrina 10 to 20 grs.; olive oil a few drops; triturate and add lard ℥j.—2. (Majendie.) 4 grs. to the ounce.—3. (Pereira.) 20 to 40 grs. to the ounce. In neuralgia, neuralgic rheumatism, gout, &c.

OINTMENT, VERDIGRIS. *Syn.* UNG. ÆRUGINIS, (P. E.) UNG. CUPRI SUBACETATIS, (P. D.) *Prep.*—1. (P. E.) Resinous ointment ℥xv; verdigris in fine powder ℥j; mix.—2. (P. D.) Verdigris ℥ss; olive oil ℥j; triturate and add resin ointment lb. j.—3. Verdigris ℥j; lard ℥xv; mix. All the above are escharotic and detergent, and are used as occasional dressings to foul and flabby ulcers, to keep down fungous flesh, and diluted with oil or lard in scrofulous ulceration and inflammation of the eyelids.

OINTMENT, VINEGAR. *Syn.* UNG. ACETI. *Prep.* (Dr. Cheston.) Olive oil lb. j; white wax ℥iv; melt, cool a little, add vinegar ℥ij, and stir till cold. A cooling astringent dressing, and as a salve in chronic ophthalmia.

OINTMENT, WAX, (YELLOW.) *Syn.* UNG. CERÆ FLAVÆ. *Prep.* (P. D.) Beeswax lb. j; lard lb. iv; melt together. A mild and cooling dressing. (See CERATE, SIMPLE.)

OINTMENT, WHITE, (CAMPHORATED.) *Syn.* UNG. ALBUM CAMPHORATUM. *Prep.* (P. L. before 1745.) Simple ointment ℥v; camphor ʒij; dissolve by a gentle heat, add finely-powdered carbonate of lead ℥j, and stir till cold.

OINTMENT, WHITE PRECIPITATE. *Syn.* OINTMENT OF AMMONIO-CHLORIDE OF MERCURY. UNG. HYDRARGYRI AMMONIO-CHLORIDI, (P. L.) UNG. PRÆCIPITATI ALBI, (P. E.) UNG. HYDRARGYRI SUBMURIATIS AMMONIATI, (P. D.) *Prep.* (P. L.) White precipitate ʒj; lard ℥iss; mix. Stimulant, alterative, and detergent; in the itch, scald-head, and various other skin diseases; in inflammation of the eyes, and to destroy vermin on the body.

OINTMENT, WORM. *Syn.* UNG. VERMIFUGUM. *Prep.* (Bat. Ph.) Aloes ʒj; dried ox-gall ʒiss; lard ℥iss; mix.

OINTMENT, YELK OF EGG. *Syn.* UNG. OVORUM. *Prep.* (Soubeiran.) Oil of almonds ℥iss; yellow wax ℥ss; melt together, and when nearly cold, add the yelk of one egg and mix well. Applied to sore nipples.

OINTMENT, ZINC, (COMPOUND.) *Syn.* UNG. ZINCI CUM LYCOPODIO. *Prep.* (Hufeland.) Oxide of zinc and lycopodium, of each ʒj; simple cerate ℥ss; mix. In excoriations and ulcerations, especially of the eyes, either alone or diluted with almond oil.

OLEFIANT GAS. *Syn.* HEAVY INFLAMMABLE AIR. CARBURETED HYDROGEN. HYDURET OF ACETULE. It may be obtained by heating a mixture of 1 part of alcohol and 6 parts of oil of vitriol, and as soon as sulphurous gas begins to come over, passing the product first through milk of lime and then through oil of vitriol. This gas is a little lighter than atmospheric air, and burns with a bright white flame. When mixed with an equal volume of chlorine over water, it soon condenses into an oily looking liquid; hence the name olefiant gas was given it by the Dutch chemists. It smells like oil of caraway. It is the presence of olefiant gas in coal gas that principally gives to the latter its illuminating properties. This gas was formerly called *per-* or *bi-carbureted hydrogen.*

OLEIC ACID. An oily acid, discovered by Chevreul in fat.

Prep. Saponify the pure oil of almonds, decompose the soap with a dilute acid, and digest the resulting oily acid in a water-bath with half its weight of oxide of lead for some hours, constantly stirring; then agitate the mixture with twice its volume of ether in a close vessel, and in 24 hours decant the clear ethereal solution; decompose with dilute muriatic acid, collect the acid that

separates, and remove the ether by evaporation. To render it still purer it must be again saponified with caustic soda, and the soap repeatedly dissolved in a solution of soda, and as often separated by adding common salt, until it becomes nearly colorless, when it must be decomposed by dilute muriatic acid as before.

Props., *&c.* An oily acid, insoluble in water, soluble in alcohol, ether, and oil, and forming salts with the bases called oleates.

OLEIN. *Syn.* ELAIN. HUILE ABSOLUE. (From ἔλαιον, oil.) The liquid portion of oil and fat; by saponification it yields oleic acid.

Prep. I. Digest the oil with a quantity of caustic soda in solution, only sufficient to saponify half the oil, and separate the undecomposed oily portion from the soap and alkaline solution. Succeeds well with recently expressed and fresh oils.

II. Almond or olive oil 1 part; strong alcohol 3 parts; mix in a flask, heat nearly to boiling, agitate, decant the clear upper stratum, and allow it to cool; filter, and gently distil off the spirit. Both the above are used by watchmakers for fine work, as they will not freeze nor thicken at ordinary temperatures. Some years ago the last was sold, by a certain metropolitan house, as watchmaker's oil, at 1*s.* 6*d.* a drachm.

OLEOMETER. (From *oleum*, oil; and *metrum*, a measure.) An instrument for ascertaining the specific gravity of oil. (See HYDROMETER and OIL.)

OLEON. A peculiar liquid obtained by the distillation of oleic acid and lime.

OLEO-PHOSPHORIC ACID. A peculiar acid found by Fremy in the brain and nervous matter.

OLEO-SACCHARUM. *Syn.* ELÆO-SACCHARUM. A mixture of sugar and essential oil. The *oleo-sacchara of aniseed, caraway, peppermint, pennyroyal, cinnamon*, and other essential oils, are made by rubbing 15 or 16 drops of the respective oils with white sugar 1 oz.; and when intended for making extemporaneous distilled waters, 1 oz. of magnesia is also added. The *oleo-sacchara of lemons, oranges*, &c., are made from the peels, as described at page 199.

OLIVILE. A white crystalline substance, obtained by Pelletier from the gum of the olive tree, (Olea Europæa.) It is soluble in hot water and alcohol.

OLIVINE. A white, crystalline, bitter substance, obtained by Landerer from the leaves of the olive tree. It dissolves in acids.

OMELETTE. A pancake or fritter made of eggs; much used on the Continent.

OMYCHILE. A brown, resinous substance, obtained by Scharling from inspissated urine.

OPHTHALMIA. *Syn.* OPHTHALMITIS. (From ὀφθαλμος, the *eye.*) Inflammation of the eye. In ordinary cases this disease is confined to the external membrane of the globe of the eye, or to the eyelids; but it occasionally attacks the sclerotica, cornea, choroid coat, and retina. In general it may be relieved by fomentations of warm water, or decoction of poppy-heads, and the use of aperient medicines; to which leeches and cupping may be added with advantage. In severe cases, general depletion and blisters to the nape of the neck must be had recourse to When the inflammation has subsided, mild astringents and cooling eye-waters and ointments will be found useful; but all applications of this kind should be used with caution. The purulent ophthalmia of new-born infants, and that which often follows the smallpox, measles, and fevers, generally yields to the use of mild astringent eye-waters and salves, and to the application, at bedtime, of a drop of wine of opium diluted with 5 or 6 drops of water. A *very weak* solution of sulphate of zinc, or the ointment of nitric oxide of mercury, will be found a good application in the latter cases. In every variety the eye should be kept clean by careful ablution with warm milk and water.

OPIANIC ACID. A crystalline substance, possessing acid properties, resulting from the oxidation of narcotine, discovered by Wöhler and Liebig. It is obtained by dissolving narcotine in dilute sulphuric acid in considerable excess; adding finely-powdered oxide of manganese, also in excess; and boiling till carbonic acid ceases to be evolved, when the liquid is filtered, and on cooling forms a crystalline mass of opianic acid. This is drained on a filter, pressed, washed with cold water, and frequently recrystallized from a saturated solution in boiling water. Scarcely soluble in *cold* water; soluble in alcohol.

OPIATE EN POUDRE. *Prep.* Bath brick 8 oz.; China ware 4 oz.; red coral 1 oz.; cinnamon and cloves, of each 1 dr.; mix. and reduce to a very fine powder. Used as a dentifrice; rapidly whitens the teeth.

OPIATE, ANTI-TUBERCULAR. (*Lepecq de la Cloture.*) *Prep.* Spermaceti, crab's eyes, and sulphur, of each ʒij; conserve of roses ℥ss; pepper mushroom ʒiij; honey q. s. to make an electuary. In pulmonary consumption. *Dose.* ℈iss to ʒiss, 3 or 4 times a day.

OPIUM. *Smyrna* or *Levant opium* should be chosen, especially for the manufacture of the salts of morphia, as it contains on the average from 7 to 9% of that alkaloid, and usually yields about 12 to 12½% of muriate of morphia, which is more than can be obtained from any other variety of opium. The following process of *Morphiometry* is given by the Edinburgh College:—Macerate 100 grs. of opium for 24 hours in f℥ij of water, filter, and strongly squeeze the residue; then precipitate with carbonate of soda ℥ss, dissolved in cold water f℥ij; heat the precipitate till it shrinks and fuses, then cool and weigh it; it should weigh at least 11 grs.; and when powdered be entirely soluble in a solution of oxalic acid.—*Another excellent process* for ascertaining the quality of opium is, to boil an infusion of 4 parts of opium with 1 part of quicklime, made into a milk with water, to filter while hot, saturate with a dilute acid, (hydrochloric,) and to precipitate the morphia by ammonia. (Couerbe.)

There have been several modes of purifying opium adopted by various persons, among which the following may be mentioned:—

SOFT PURIFIED OPIUM. (*Opium purificatum Molle.*) Picked opium softened with water to a pillular consistence.

HARD PURIFIED OPIUM. (*Opium purif. durum.*) Picked opium dried in a water-bath for powdering.

STRAINED OPIUM. (*Ext. Thebaicum. Opium*

Colatum. Opium Purificatum. Laudanum Opiatum.) Opium dissolved, or softened, in an equal weight of water, pressed through canvass, and evaporated to a pillular consistence.

HOMBERG'S PURIFIED OPIUM. Opium exhausted by repeated coction in 10 or 12 times its weight of water, and the mixed liquors evaporated to ½, and kept boiling for 2 or 3 months, adding water from time to time, then straining and evaporating to a pillular consistence.

BAUME'S PURIFIED OPIUM. The same as the last.

CORNETTE'S PURIFIED OPIUM. The common extract dissolved in cold water, strained, and evaporated to an extract, and the process repeated several times.

JOSSE'S PURIFIED OPIUM. Crude opium worked under water as long as any thing is dissolved, the solution strained, and evaporated to an extract.

ACCARIE'S PURIFIED OPIUM. Infusion of opium digested with powdered charcoal for some days, strained, clarified with white of egg, and evaporated to an extract.

POWEL'S PURIFIED OPIUM. Opium exhausted by coction with water, the residuum treated with spirit of wine, and the mixed tincture and decoction evaporated to an extract.

NEUMANN'S OPIUM. Infusion of opium, strained, fermented with a little sugar, set it in a warm place, and when the fermentation slackens, it is again excited by stirring up the lees; continue this for some months, or as long as it can be made to ferment. It is either evaporated to an extract or kept in the liquid form.

LANCELOTTE'S PREPARED OPIUM. Opium lb. j; quince juice 1 gall.; pure potassa ℥j; sugar ℥iv; ferment for some time, evaporate to a sirup, digest in spirit of wine, filter, and distil off the spirit.

QUERCETAN'S OPIUM. Vinegar of opium evaporated to an extract.

GLASER'S PREPARED OPIUM. An infusion of opium made with may-dew, filtered and evaporated.

GLAUBER'S PREPARED OPIUM. Opium ℥iv; spirit of salt ℥iss; cream of tartar ℥j; mix, digest in spirit of wine 1 quart, filter, and evaporate.

*** Of the above, those that are made with cold water, or by fermentation, are considered milder than crude opium; the latter resemble "*The black drop.*"

OPODELDOC. *Syn.* SOAP LINIMENT. This article, prepared according to the directions of the Pharmacopœia, is apt to gelatinize, or to deposite crystals of elaidate and stearate of lime. This may be avoided where expense is not an objection, by well drying the soap, employing a spirit of 85§, and keeping it in well-closed vessels.

OPODELDOC, STEER'S. *Prep.* I. White Castile soap, cut very small, 2 lbs.; camphor 5 oz.; oil of rosemary 1 oz.; oil of origanum 2 oz.; rectified spirit 1 gall.; dissolve in a corked bottle by the heat of a water-bath, and when considerably cooled, strain; add liquor of ammonia 11 oz.; immediately put it into bottles, (Steer's,) cork close, and tie over with bladder. Very fine, solid and transparent when cold.

II. Soap 4 oz.; camphor 1 oz.; oils of rosemary and origanum, of each 1 dr.; rectified spirit 1 pint; liquor of ammonia 1½ oz.; mix.

III. To the last add water ½ pint. Used as a liniment.

ORANGEADE. *Syn.* ORANGE SHERBET. Prepared with oranges in the same way as lemonade.

ORANGE DYE. This may be given by mixing red and yellow dyes in various proportions. A very good fugitive orange may be given with annotto, by passing the goods through a solution made with equal parts of annotto and pearlash; or still better, through a bath made of 1 part of annotto dissolved in a lye of 1 part each of lime and pearlash, and 2 parts of soda. The shade may be reddened by passing the dyed goods through water acidulated with vinegar, lemon-juice, or citric acid; or through a solution of alum. The goods are sometimes passed through a weak alum mordant before immersion in the bath.

ORANGE PEEL, CANDIED. This is prepared in the same way as candied citron or lemon peels.

ORCEINE. *Syn.* LICHEN LAKE. A brownish-red powder, obtained by dissolving orcine in liquor of ammonia, exposing the solution to the air, and precipitating with an acid.

ORCINE. The coloring principle of the lichen dealbatus. It may be obtained by treating the powder with boiling alcohol, filtering while hot, cooling, again filtering, distilling off the alcohol, evaporating to a sirup, triturating with water, filtering, again evaporating to a sirup, and leaving the liquid for some days in a cool place, when crystals of orcine will form. It is volatile, and soluble in water and alcohol. By solution in ammonia it yields orceine.

ORGEAT. *Syn.* SIROP D'ORGEAT. BARLEY SIRUP. *Prep.* I. Sweet almonds 1 lb.; bitter almonds ¼ oz.; blanch, beat to a paste, and make an emulsion with barley water 1 quart; strain, and to each pint add sugar 1½ lb.; and a tablespoonful of orange-flower water.

II. Sweet almonds 3 oz.; 2 bitter almonds; orange-flower water 1 tablespoonful; milk 1 quart; sugar 1 lb.; make an emulsion. Some persons add a little brandy.

ORES. The mineral bodies from which metals are extracted. (See TESTING and METALS.)

OSMIUM. (From *οσμε, odor.*) A rare metal found associated with the ore of platinum. Its sp. gr. is 7. It forms several compounds with oxygen, chlorine, and sulphur, of which the most remarkable is *osmic acid*. This compound is very volatile, and evolves a pungent and disagreeable odor, which has given the name to the metal. (See IRIDIUM.)

OXALATES. *Syn.* OXALAS, (*Lat.*) A compound of oxalic acid and a base. (See OXALIC ACID.)

OXALATES OF POTASH. *Prep.* I. (*Oxalate of Potash. Potassæ Oxalas.*) Neutralize a solution of oxalic acid, or the acid oxalates of commerce, with carbonate of potash, evaporate and crystallize.

II. (*Binoxalate of Potash. Potassæ Binoxalas. Salt of Sorrel. Sal acetosellæ.*) By saturating a solution of 1 part of oxalic acid with carbonate of potash, and adding it to a similar solution of 1 part of the acid unneutralized; evaporating and crystallizing. It may also be obtained from the expressed juice of wood or sheep's sorrel

by clarifying with eggs or milk, evaporating and crystallizing. In commerce the *quadroxalate of potash* is usually substituted for it.

III. (*Quadroxalate of Potash. Potassæ Quadroxalas.*) By neutralizing 1 part of oxalic acid with carbonate of potash, adding to the solution 3 parts more of acid, evaporating and crystallizing. Or by dissolving the binoxalate in dilute hydrochloric, and crystallizing. This salt is commonly sold in commerce as *Binoxalate of Potash, Sal Acetosellæ, Salt of Sorrel,* and *Essential Salt of Lemons.* Both this and the binoxalate are used to remove ink and iron stains from linen, to bleach the straw used for making bonnets, and occasionally in medicine as a refrigerant. When pure, each of the above yields nothing but carbonate of potash by heat. *** All the oxalates of potash are poisonous.

OXALIC ACID. *Syn.* Acid of Sugar. Acidum Oxalicum, (*Lat.*) Acide Oxalique, (*Fr.*) Sauerkleesäure, (*Ger.*) This acid was discovered by Scheele in 1776. It occurs both in the mineral and organic kingdoms, and is produced artificially by the action of nitric acid on sugar, starch, woody fibre, &c.

Prep. I. (Liebig.) Nitric acid (sp. gr. 1·42) 5 parts; water 10 parts; mix, add sugar, or preferably potato starch 1 part, and digest by a gentle heat as long as gaseous products are evolved; evaporate and crystallize; dry the crystals, redissolve, and crystallize. 12 parts of potato starch yield 5 of acid. The mother water, treated with more nitric acid, and again warmed, will yield a second crop of crystals; and this should be repeated till the solution is exhausted.

II. (Ure.) Nitric acid (sp. gr. 1·4) 4 parts; sugar 1 part; digest together in a water-bath.

III. (Schlesinger.) Sugar 4 parts, (dried at 257° F.;) nitric acid (1·38) 33 parts; the mixture, as soon as the evolution of gas ceases, is to be boiled down to one-sixth its original volume, and allowed to crystallize. The whole process may be executed in 2 hours, and in 1 vessel, and yields of beautifully crystallized oxalic acid from 56 to 60% of the sugar employed.

Remarks. On the large scale, the first part of the process is usually conducted in salt-glazed stoneware pipkins, about two-thirds filled and set in a water-bath; but on the small scale, a glass retort or capsule may be used. The evaporation should be preferably conducted by steam. The evolved nitrous vapors are usually allowed to escape, but if conveyed into a chamber filled with cold damp air, and containing a little water, they will absorb oxygen, and be recondensed into fuming nitric acid. In England an equivalent proportion of molasses is usually substituted for sugar. Messrs. Davy, Macmurdo & Co.'s patent process, consists in first converting potato fecula into grape sugar with sulphuric acid, and then decomposing the sugar thus obtained by nitric acid, in the usual way. Dr. Ure recommends the use of a little sulphuric acid along with the nitric acid, which, he says, contributes to increase the product. "15 lbs. of sugar yield fully 17 lbs. of crystallized oxalic acid." (Ure.) Chemically pure oxalic acid is best prepared by precipitating a solution of binoxalate of potash with acetate of lead, washing the precipitate with water, and decomposing it while still moist with dilute sulphuric acid or sulphuretted hydrogen.

Prop., Uses, &c. Pure oxalic acid forms odorless, colorless, prismatic crystals, possessing a powerful sour taste, and forming salts with the bases termed Oxalates. It effloresces in warm dry air, fuses and sublimes at 350°, dissolves in 8 parts of water and 4 parts of alcohol at 60°, and in its own weight of boiling water. Oxalic acid is chiefly used in the arts of calico printing and bleaching; to remove ink-spots and iron-moulds from linen, and to clean boot-tops. It is *poisonous.*

Tests. 1.—Oxalic acid gives a white precipitate with nitrate of silver, soluble in nitric acid, and which, when heated, yields pure silver.—2. With lime water or muriate of lime a white precipitate, soluble in nitric acid.

Ant. Promote vomiting, and administer chalk, whiting, or magnesia, mixed up with water, in considerable quantities.

OXALURIC ACID. A new acid discovered by Wöhler and Liebig, and obtained by heating a solution of parabanic acid with ammonia, and decomposing a hot saturated solution of the resulting oxalurate of ammonia with dilute sulphuric acid, and rapidly cooling the liquid, when oxaluric acid falls as a white crystalline powder.

OXAMETHANE. *Syn.* Etheroxamide. Oxalate of Ether and Oxamide. A colorless crystalline substance, prepared by dissolving oxalic ether in alcohol, and gradually adding alcohol saturated with dry ammoniacal gas, till a white powder begins to fall, when after some hours the solution is filtered, evaporated, and crystallized.

OXAMIDE. *Syn.* Oxalamide. A snow-white, tasteless, crystalline powder, obtained during the destructive distillation of oxalate of ammonia.

OXIDE. (Oxydum, *Lat.*, from ὀξύς, *acid,* and εἶδος, *form.*) A compound of oxygen and a metal. The oxides unite with the acids, forming compounds called *salts.* To designate the different oxides of the same base, and to mark the number of equivalents of oxygen combined with one equivalent of metal, derivatives from the Greek or Latin are generally employed. Thus the terms *oxide* or *protoxide,* the *deutoxide, tritoxide,* &c., are applied to the *first, second, third,* &c. oxide of the same base; and the last oxide, in which the base is saturated with oxygen, without being *acid,* is called the *peroxide.* In like manner the terms *oxide* or *protoxide, sesquioxide, binoxide, teroxide,* &c., denote that the oxygen is in the ratio to the metal of 1 to 1,—1½ to 1 or 3 to 2,—2 to 1,—3 to 1, &c. The Greek numerals *dis, tris, tetrakis,* &c., are prefixed in a similar way, to denote oxides formed of 1 equivalent of oxygen with 2, 3, or more equivalents of metal. More complex ratios are denoted by a fraction, the numerator of which represents the eq. of oxygen, and the denominator the eq. of metal. The terminations *ous* and *ic* are occasionally employed in the same way as noticed under acids, the former being applied to the lower and the latter to the higher state of oxidizement, as *cuprous oxide, cupric do., ferrous oxide, ferric do.,* applied to the respective oxides of copper and iron. Oxides containing less than 1 eq. of oxygen to 1 eq. of metal, are commonly called *suboxides.* The same system of nomenclature is also applied

to saline compounds; as—*protochloride, sesquichloride, bichloride, terchloride, oxalate, binoxalate, sulphate, bisulphate, &c.*

OXYCHLORIDES. Compounds formed by the union of a metallic oxide with the chloride of a metal. They are commonly called *subchlorides*, or *submuriates*. (See INDEX.)

OXYFLUORIDES. Double compounds of fluorides and oxides. They possess no practical importance.

OXYGEN. *Syn.* OXYGEN GAS. VITAL AIR. EMPYREAL DO. DEPHLOGISTICATED DO. OXYGENE, (*Fr.*) SAUERSTOFF, (*Ger.*) OXYGENIUM, (*Lat.*, from ὀξὺς, *acid*, and γεννάω, *I generate.*) An elementary gaseous body, discovered by Priestley in 1774.

Prep. I. Place chlorate of potash in a green glass retort, and heat it nearly to redness over a spirit-lamp. *Pure. Prod.* 100 grs. yield nearly 100 cubic inches. (Brande.) 100 grs. yield 115 cubic inches. (Ure.)

II. Expose red oxide of mercury to heat as above. Pure.

III. (Faraday.) Coarsely-powdered chlorate of potash 3 parts; powdered binoxide of manganese 1 part; (both by measure;) mix, put them into a flask or retort, and place it over the flame of a spirit-lamp, or a few pieces of ignited charcoal, when in a few minutes oxygen will be evolved with a rapidity entirely at the command of the operator, by either increasing or lessening the heat. The residue in the retort may be kept for another operation, if not exhausted, or may at once be washed out with a little warm water, and the manganese reserved for another time, as it is uninjured by the process. Red lead, black oxide of copper, and several other substances, will answer *nearly* as well as oxide of manganese. "100 grs. of the mixture yield 110 cubic inches of pure oxygen." (G. F. Fisher.) This is a very convenient and simple process.

IV. (Balmain.) Bichromate of potash 3 parts; oil of vitriol 4 parts; mix, and heat as above. Yields pure oxygen with a rapidity entirely at the command of the operator.

V. Expose nitre to a red heat in an iron retort. 1 lb. yields 1200 cubic inches slightly contaminated with nitrogen.

VI. Expose black oxide of manganese to a red heat as last. *Prod.* 1 oz. of pure binoxide of manganese yields 44 grains or 128 cubic inches of gas. (Liebig.) 1 lb. of common oxide of manganese yields from 30 to 40 pints, and fine samples from 40 to 50 pints of gas sufficiently pure for ordinary purposes. This is the most economical process on the large scale.

VII. Binoxide of manganese and oil of vitriol, equal parts; mix them well together in a glass retort, and apply heat. *Prod.* Every 44 grs. of pure binoxide of manganese yield 8 grs. or 24 cubic inches of oxygen. 1 oz. yields 88 grs., or 256 cubic inches. (Liebig.)

Remarks. The gas procured by any of the above processes must be collected in the usual way, either over water, mercury, or in bags. The gas procured from manganese or nitre may be purified by passing it through milk of lime, or a solution of caustic potassa.

Props., Uses, &c. Colorless, odorless, tasteless, and incombustible; sp. gr. 1·111, (1·026 Berzelius, Dulong, &c.;) 100 cubic inches weigh 33·6 grs.; it is a powerful supporter of combustion, and its presence is essential to the existence of both animal and vegetable life; it forms 21% by volume of the atmosphere. It is distinguished from other gases by yielding nothing but pure water when mixed with twice its volume of hydrogen and exploded, or when a jet of hydrogen is burned in it. A recently-extinguished taper, with the wick still red hot, instantly inflames when plunged into this gas. A small spiral piece of iron wire ignited at the point, and suddenly plunged into a jar of oxygen, burns with great brilliancy and rapidity. Water dissolves about 5% by volume of oxygen, but by pressure a much larger quantity. It is said to be a valuable remedial agent in asphyxia arising from the inhalation of carbonic acid or carbonic oxide.

OSMAZOME. A brownish yellow substance, having the smell of soup, obtained by digesting raw muscular fibre in cold water, filtering, evaporating, treating the residue with alcohol, and again filtering and evaporating.

OXYMEL. (From ὀξυς, *acid*, and μελι, *honey.*) An acidulous sirup made of honey and vinegar. (See FILTRATION, CLARIFICATION, and SIRUP.)

OXYMEL OF COLCHICUM. *Syn.* OXYMEL (CORMI) COLCHICI. *Prep.* (P. D.) Fresh corms (roots) of meadow saffron ℥j; distilled vinegar 1 pint, (wine measure;) macerate for 2 days, press out the liquor, filter, add clarified honey lb. ij, and boil down to the consistence of a sirup, frequently stirring. *Dose.* 1 to 3 dr. twice a day, in gout, rheumatism, dropsy, &c.

OXYMEL OF CREAM OF TARTAR. *Syn.* OXYMEL POTASSÆ BITARTRATIS. *Prep.* Powdered cream of tartar ℥ij; hot water ¼ pint; honey lb. ij; boil for 10 minutes, and strain. Cooling; laxative; used to "cut the phlegm," &c.

OXYMEL OF GARLIC. *Syn.* OXYMEL ALLII. *Prep.* (P. L. 1746.) Sliced garlic ℥iss; caraway seed, and sweet fennel seed, of each ʒij; boiling vinegar f℥viij; infuse, strain, and add clarified honey ℥x.

OXYMEL, PECTORAL. *Syn.* OXYMEL PECTORALE. *Prep.* (Brun's Ph.) Bruised elecampane ℥j; do. orris root ℥ss; water f℥xxxvj; boil to ℥xxiv; strain, add honey ℥xvj, ammoniacum ℥j, (dissolved in) vinegar f℥viij; boil to an oxymel. In coughs, &c.

OXYMEL OF SQUILLS. *Syn.* HONEY OF SQUILLS. OXYMEL SCILLÆ. (P. L. & D.) DO. SCILLITICUM. *Prep.* (P. L.) Clarified honey lb. iij; vinegar of squills 1½ pints; boil to a proper consistence. Expectorant. *Dose* fʒj to fʒij, in chronic coughs and asthma.

OXYMEL, SIMPLE. *Syn.* OXYMEL, (P. L. & D.) DO. SIMPLEX. VINEGAR SIRUP. MEL ACETATUM. SYRUPUS ACETI. SYR. ACIDI ACETICI. *Prep.* (P. L.) Clarified honey lb. x; acetic acid (P. L.) 1½ pints; mix with heat. Expectorant and refrigerant. *Dose.* ʒj to ℥ss, diluted with water, in coughs, &c.; diffused through some demulcent liquid, it is used as a drink in fevers, and added to gargles in sore throat. *** The following are the proportions I have seen used in trade:—Honey 12 lbs.; distilled vinegar (of 5%) 2 quarts; evaporate if required.

OXYMEL OF VERDIGRIS. (See LINIMENT OF VERDIGRIS.)

OXYSACCHARA. Sirups acidulated with vinegar.

OYSTERS are nutritious, and easy of digestion. They are in season in each month of the year, the name of which contains the letter R. The *best* British oysters are found at Purfleet; the *worst* near Liverpool.

OZONE. This term has been applied to the odor perceived in the immediate vicinity of electrical machines in good action.

PAINTINGS. *Pres. and Restor.* Many valuable paintings suffer premature decay, from the attacks of a microscopic insect of the mite class. This is especially the case with "*Christ's Passion*," by Northcote, in the Hanover chapel, Regent-street,—the "*Raising of Lazarus*," in the National Gallery, and several pictures in the Louvre. The best method of preventing this species of decay, is to add a few drops of creosote to the paste and glue used to line the picture, as well as to make a similar addition to the varnish. If it has already commenced, the painting should be at once carefully cleaned and relined, observing to employ a little creosote in the way just mentioned. Paintings should be kept in as pure an atmosphere as possible, and in a moderately dry situation; as it is the presence of sulphureted hydrogen in the air that blackens the "lights," and causes most of the middle tints and shades to fade; and it is exposure to damp that produces mouldiness and decay of the canvass. For this reason valuable paintings should not be kept in churches, nor suspended against heavy walls of masonry, especially in badly-ventilated buildings. Excess of light, particularly the direct rays of the sun, also acts injuriously on paintings. The blackened lights of old pictures may be instantly restored to their original hue, by touching them with deutoxide of hydrogen, diluted with 6 or 8 times its weight of water. The part must be afterwards washed with a clean sponge and water.

PAINTS, FISH OIL. *Prep.* Dissolve white vitriol and litharge, of each 14 lbs., in vinegar 32 gallons; add whale, seal, or cod oil 1 ton, and boil to dryness, continually stirring during the ebullition. The next day decant the clear portion, add boiled linseed oil 12 gallons, oil of turpentine 3 gallons, and mix well together. The sediment left is well agitated with half its quantity of lime water, used for some inferior paints, under the name of "*prepared residue oil.*" This oil is used for various common purposes, as a substitute for linseed oil, of which the following paints are examples:—

1. (*Green.*)—*a.* Lime water 6 galls.; whiting and road dust, of each 1 cwt.; blue black 30 lbs.; yellow ochre 28 lbs.; wet blue (previously ground in *prepared residue oil*) 20 lbs.; grind well together. For use, thin with equal parts of *prepared residue oil* and linseed oil. Pale.—*b.* Yellow ochre and wet blue, of each 1 cwt.; road dust 1½ cwt.; blue black 10 lbs.; lime water 6 gallons; prepared fish oil 4 gallons; prepared residue and linseed oils, of each 7½ gallons. Bright green.

2. (*Lead color.*) Whiting 1 cwt.; blue black 7 lbs.; whitelead (ground in oil) 28 lbs.; road dust 56 lbs.; lime water 5 gallons; prepared residue oil 2½ gallons.

3. (*Reddish brown.*) Lime water 8 gallons; Spanish brown 1 cwt.; road dust 2 cwt.; prepared fish, prepared residue, and linseed oils, of each 4 gallons.

4. (*Yellow.*) Substitute yellow ochre for Spanish brown in the last receipt.

5. (*Black.*) Substitute lamp or blue black for Spanish brown in No. 3.

6. (*Stone color.*) Lime water 4 gallons; whiting 1 cwt.; whitelead (ground in oil) 28 lbs.; road dust 56 lbs.; prepared fish, linseed, and prepared residue oils, of each 3 gallons.

7. (*Chocolate.*) No. 3 and No. 5 mixed together so as to form a chocolate color.

Remarks. All the above paints require a little "*driers.*" They are well fitted by their cheapness, hardness, and durability, for common outdoor work.

PAINTS, FLEXIBLE. *Prep.* Yellow soap cut into slices 1½ lbs.; boiling water 1 gall.; dissolve and mix while hot with oil paint 1¼ cwt. Used to paint canvass.

PAINTS, TO MIX. In mixing paints, *observe*, that for *out-door work* you must use principally or wholly boiled oil, unless it be for the decorative parts of houses, &c., then mix as for in-door work.—For *in-door work* use linseed oil, turpentine, and a little "*driers*," observing, that the less oil, the less will be the gloss, and that for "*flatted white*," &c., the color being ground in oil, will scarcely require any further addition of that article, as the object is to have it dull. The best "*driers*" are, ground litharge and sugar of lead;—the former for dark and middle tints, and the latter for light ones.

PALLADIUM. A metal resembling platinum, discovered by Wollaston in 1803. It is obtained by adding a solution of bicyanide of mercury to a neutral solution of the ore of platinum in nitromuriatic acid, and exposing the precipitate to a red heat. It resembles platinum in appearance. Sp. gr. 11·3 to 11·8. It forms compounds with oxygen, chlorine, and sulphur.—*Protoxide of palladium* is precipitated as a brown hydrate by adding an alkaline carbonate in excess to any of its salts; and this precipitate, when heated to redness, forms the anhydrous black protoxide. It forms salts with the acids.—*Binoxide of palladium* is best obtained by treating solid bichloride of palladium and potassium with a solution of potassa in excess, and heating the mixture to 212°. Black.—*Protochloride* of palladium is a brown crystalline mass, obtained by evaporating the nitromuriatic solution to dryness. By heat it loses its water and turns black. Oxide of palladium forms red salts with the acids. The neutral solutions of palladium are precipitated in the metallic state by sulphate of iron,—dark brown by sulphureted hydrogen, olive by prussiate of potash, and yellowish white by prussiate of mercury. By the last test it is easily distinguished from platinum.

PALMIC ACID. *Prep.* Decompose soap prepared from palmine and potassa, by tartaric acid, dissolve the fatty acid that separates in cold alcohol, and evaporate. Crystallizable; soluble in alcohol and ether; melts at 122°. It may also be

made from the solid mass obtained by passing sulphurous acid through castor oil.

PALMINE. A new fatty substance obtained by treating castor oil with nitrous acid. It melts at 143°, and when saponified yields palmic acid and oxide of glycerule.

PALMITIC ACID. Prepared from *palm oil* in a similar way to palmic acid from palmine. It is purified by pressure between paper, washing with hot alcohol, and crystallization from hot ether. It forms pearly scales, and melts at 140°, like margaric acid.

PALMITINE. The chief ingredient of palm oil or butter. It is purified in the same way as the last.

PANACEA. (From *πάν*, *all*, and *ακεομαι*, *I cure.*) A term applied by the ancients to those remedies supposed to be capable of curing all diseases. Unfortunately for mankind, no such a medicine exists. The name is still applied to some quack medicines.—PANACEA OF ANTIMONY (*Pan. Antimonii*) is prepared by deflagrating in a red-hot crucible a mixture of sulphuret of antimony ℥vj, nitre ℥x, common salt ʒiss, and charcoal dust ʒj. The uppermost spongy scoria is rejected, and the remainder powdered and well washed. Golden-colored. The active ingredient in *Lockyer's Pills.*—PANACEA OF MERCURY, (*Pan. Mercurialis.*) Mercurius dulcis (calomel) sublimed 9 times.

PAPER, COPYING. *Prep.* Make a stiff ointment with butter or lard and lampblack, and smear it thinly and evenly over soft writing paper, by means of a piece of flannel, then wipe off the redundant portion with a piece of soft rag. Placed on paper and written on with a style or solid pen. By repeating the arrangement, two or three copies of a letter may be obtained at once. This paper, set up in a case, forms the ordinary "*Manifold writer.*"

PAPER DYES. Paper and parchment may be stained by any of the simple dyes or liquid colors.

PAPER, FIREPROOF. This is prepared in a similar way to fireproof cloth. (See INCOMBUSTIBLE CLOTH, and FIRES.)

PAPER OF SAFETY. *Syn.* PAPIER DE SURETE. White paper pulp mixed with an equal quantity of pulp tinged with any stain easily affected by chlorine, acids, alkalis, &c., and made into sheets as usual.

PAPER, OILED. *Prep.* Brush sheets of paper over with "boiled" oil, and suspend them on a line till dry. Waterproof. Extensively employed to tie over pots and jars, and to wrap up paste blacking, ground whitelead, &c.

PAPER, TRACING. *Prep.* I. Lay open a quire of paper, of large size, and apply with a clean sash tool a coat of varnish, made of equal parts of Canada balsam and oil of turpentine, to the upper surface of the first sheet, then hang it on a line, and repeat the operation on fresh sheets until the proper quantity is finished. If not sufficiently transparent, a second coat of varnish may be applied as soon as the first has become quite dry.

II. Rub the paper with a mixture of equal parts of nut oil and oil of turpentine, and dry it immediately by rubbing it with wheat flour, then hang it on a line for 24 hours. Both the above are used to copy drawings, writings, &c. If washed over with ox gall and dried, they may be written on with ink or water colors. The paper prepared from the refuse of the flax mill, and of which bank notes are made, is also called *tracing paper*, and sometimes *vegetable paper.*

PAPER, WAXED. *Prep.* Place cartridge paper on a hot iron plate and rub it with beeswax. Used to form extemporaneous steam or gas pipes, and to cover the joinings of vessels.

PAPERS, TEST. *Litmus*, *Turmeric*, *Cherry-juice*, *Mallow flower*, *Elderberry*, *Brasil wood*, *Buckthorn*, *Dahlia petal*, *Acetate of Lead*, *Diacetate of Lead*, *Protosulphate of Iron*, *Starch*, *&c.*, *papers*, are made by wetting sheets of unsized writing paper with an infusion or solution of the respective substances. They are all used as tests to discover acids, alkalis, sulphureted hydrogen, iodine, &c.

PAPIER-MACHE. Pulped paper moulded into forms. It possesses great strength and lightness. It may be rendered partially waterproof by the addition of sulphate of iron, quicklime, and glue, or white of egg, to the pulp; and incombustible by the addition of borax and phosphate of soda. The papier-maché tea-trays, waiters, snuff-boxes, &c., are prepared by pasting or gluing sheets of paper together, and submitting them to powerful pressure, by which the composition acquires the hardness of board when dry. Such articles are afterwards japanned, and are then perfectly waterproof.

PARABANIC ACID. A new acid, obtained by Wöhler and Liebig by treating 1 part of uric acid or alloxan with 8 parts of strong nitric acid, and evaporating to a sirup, when crystals form after standing some time, which are purified by resolution and crystallization. Soluble in water.

PARACYANOGEN. The brown solid matter left in the retort, when cyanide of mercury is decomposed by heat. Cyanogen and paracyanogen are isomeric compounds: hence the name. Insoluble in water.

PARAFFINE. (From *parum*, little, and *affinis*, akin.) *Prep.* Distil beech tar to dryness, rectify the heavy oily portion of the product till a thick matter begins to rise, then change the receiver, and moderately urge the heat as long as any thing passes over. Next digest the product in the second receiver, in an equal measure of alcohol of 0·833, and gradually add 6 or 7 parts more of alcohol. Crystals of paraffine will gradually fall down, which, after being washed in cold alcohol, must be dissolved in boiling alcohol, which will deposite crystals of pure paraffine as it cools. White; odorless; tasteless; sp. gr. 0·87; melts at 112°, and dissolves in boiling alcohol and in oils. It burns entirely away with a clear white flame, without smoke.

PARANAPHTHALINE. *Syn.* ANTHRACINE. A substance found in coal tar. Naphthaline, and paranaphthaline, are isomeric compounds: hence the name, from *παρα*, near to.

PARAPHOSPHORIC ACID. (See METAPHOSPHORIC ACID.)

PARFAIT AMOUR. *Prep.* The peels of 12 lemons; rectified spirit of wine 2 gallons, digest 1 week; add water 1 quart, distil 2 gallons, and add an equal weight of simple sirup, and a little roas-

y-powdered cochineal to color. A pleasant cordial liqueur.

PARFUM. (*Pour parfumer les autres poudres.*) Poudre d'Ambrette 12 lbs.; civet 1½ oz.; musk 1 dr.; reduce the last two to powder by grinding them with some dry lump sugar; then mix the whole together and pass it through a sieve. See POUDRES.)

PASTE, ALMOND. *Syn.* PASTA AMYGDALINA. PASTA REGIA. *Prep.* I. LIQUID.—*a.* (*Honey Paste.*) Clarified honey and white bitter paste, of each 1 lb.; knead together, and when well mixed, add, in alternate portions, oil of almonds 2 lbs., and the yelks of 5 eggs. Much esteemed.—*b.* (*Orange.*) Blanched sweet almonds and white sugar, of each 1 lb.; blanched bitter almonds ½ oz.; beat to a perfectly smooth paste, with orange-flower water q. s., so that it may be sufficiently stiff not to stick to the fingers. In a similar way are made *rose, vanilla, nosegay,* and other almond pastes.

II. PULVERULENT. *a.* (*Gray.*) Prepared from the cake of bitter almonds, from which the oil has been thoroughly expressed, by drying, grinding, and sifting.—*b.* (*Bitter White.*) As the last, but the almonds are blanched before being pressed.—*c.* (*Sweet White.*) As the last, but using sweet almonds. *** All the above are employed as cosmetics. The *honey,* and the *sweet* and *bitter white pastes* are those most esteemed.

PASTE, CHINESE. *Prep.* Bullock's blood 10 lbs.; finely-powdered quicklime 1 lb.; mix well. For use, it is beat up with water. This paste will seldom keep good longer than three weeks.

PASTE, FLOUR. *Syn.* COLLE DE PATE. Wheat flour made into a thin batter with cold water, and then boiled. *** It must be stirred all the time it is on the fire, to prevent its getting lumpy. Paper-hangers, shoemakers, &c., usually add to the flour one-sixth to one-fourth of its weight of finely-powdered rosin. The latter is sometimes called "*hard paste.*" The addition of a few drops of oil of cloves or creosote, or a little powdered camphor or colocynth, (especially the first and second,) will prevent insects from attacking it, and preserve it in covered vessels for years. Should it get too hard it may be softened with water.

PASTE, FURNITURE. *Prep.* I. Turpentine 1 pint; alkanet root ½ oz.; digest until sufficiently colored, then add beeswax, scraped small, 4 oz.; put the vessel into hot water, and stir until dissolved. If wanted *pale,* the alkanet should be omitted.

II. (*White.*) White wax 1 lb.; liquor of potassa ½ gallon; boil to a proper consistence.

III. Beeswax 1 lb.; soap ¼ lb.; pearlash 3 oz., (dissolved in water ½ gallon, and strained;) boil as last.

PASTE, GERMAN. *Prep.* Pea meal 2 lbs.; blanched sweet almonds 1 lb.; fresh butter or lard ½ lb.; moist sugar 5 oz.; a shred or two of hay saffron; beat to a smooth paste, and granulate it by passing it through a colander. The addition of the yelks of 2 or 3 eggs improves it. *Used* to feed larks, nightingales, and other insectivorous birds. It will keep good for 6 months in a dry place.

PASTE, ORANGE. *Prep.* Blanched bitter almonds 7 lbs.; orange flowers 2½ lbs.; beat to a paste. *Used* as a cosmetic.

PASTE, ORGEAT. *Prep.* Blanched Jordan almonds 1 lb.; do. bitter almonds ¼ lb.; beat to a paste with orange-flower water q. s., and put it into pots. For use mix an ounce with half a pint of water, and strain through a piece of flannel.

PASTE, RAZOR. *Prep.* I. Levigated oxide of tin (prepared putty powder) 1 oz.; powdered oxalic acid ¼ oz.; powdered gum 20 grs.; make it into a stiff paste with water, and evenly and thinly spread it over the strop. With very little friction this paste gives a fine edge to the razor, and its efficiency is still further increased by moistening it.

II. (Mechi's.) Emery reduced to an impalpable powder 2 parts; spermaceti ointment 1 part; mix together, and rub it over the strop.

III. Jewellers' rouge, blacklead, and suet, equal parts; mix.

PASTE, SHAVING. *Prep.* White wax, spermaceti, and almond oil, of each ¼ oz.; melt, and while warm, beat in 2 squares of Windsor soap previously reduced to a paste with rose water.

PASTES. *Syn.* FACTITIOUS GEMS. PIERRES PRECIEUSES ARTIFICIELLES, (*Fr.*) GLASPASTEN, (*Ger.*) Vitreous compounds made to imitate the gems. In addition to the remarks at page 331, it may be observed that the beauty of pastes, or factitious gems, especially the brilliancy of mock diamonds, is mainly dependent upon the setting up and the skilful arrangement of the foil or tinsel behind them. The following are the most approved formulæ for producing exact imitations of several of the gems:—

I. AMETHYST.—1. (M. Lançon.) Strass 9216 grs.; oxide of manganese 15 to 24 grs.; oxide of cobalt 1 gr.—2. (M. Douault-Wiéland.) Strass 4608 grs.; oxide of manganese 36 grs.; oxide of cobalt 24 grs.; purple of cassius 1 gr.

II. BERYL, or *aqua marina.* (M. Douault-Wiéland.) Strass 3456 grs.; glass of antimony 24 grs.; oxide of cobalt 1½ grs.

III. CHRYSOLITE. Strass 5 lbs.; calcined peroxide of iron 3 to 4 drs.

IV. CORNELIAN.—1. (*Red.*) Strass 2 lbs.; glass of antimony 1 lb.; calcined peroxide of iron (rouge) 2 oz.; manganese 1 dr.—2. (*White.*) Strass 2 lbs.; washed yellow ochre 2 dr.; calcined bones 1 oz.

V. DIAMOND. Syn. *Strass. Paste.* 1. (M. Fontanier.)—*a.* Litharge 20 parts; silica 12 parts; nitre and borax, of each 4 parts; white arsenic 2 parts; powder, mix, fuse in a crucible, pour the melted mass into water, separate any reduced lead, and again powder and remelt.—*b.* (*Mayence base.*) Silica 8 oz.; salt of tartar 24 oz.; mix bake, cool, wash with dilute nitric acid, and afterwards with water; dry, powder, add 12 oz. of pure carbonate of lead, and to every 12 oz. of the mixture add borax 1 oz.; triturate in a porcelain mortar, melt in a clean crucible, and pour the fused compound into cold water; dry, powder, and repeat the process a second and a third time in a clean crucible, observing to separate any revived lead. To the third fritt add nitre 5 drachms, and again melt. Very brilliant.—*c.* Carbonate of lead 8 oz.; powdered borax 2 oz.; rock crystal 3 oz.; manganese ½ gr.; mix, and proceed as last. —2. (Loysel.) Pure silex 100 parts; red oxide of lead (minium) 150 parts; calcined potash 30 to

35 parts; calcined borax 10 parts; oxide of arsenic 1 part. This produces a paste which has great brilliancy and refractive and dispersive powers, and also a similar specific gravity to the oriental diamond. It fuses at a moderate heat, and acquires the greatest brilliancy when remelted, and kept for 2 or 3 days in a fused state, in order to expel the superabundant alkali, and perfect the refining. (Polytech. Journ.)—3. (M. Douault-Wiéland.)—*a.* Rock crystal 4056 grs.; minium 6300 grs.; potash 2154 grs.; borax 276 grs.; arsenic 12 grs.;—*b.* Sand 3600 grs.; pure carbonate of lead 8508 grs.; potash 1260 grs.; borax 360 grs.; arsenic 12 grs.—4. (M. Lançon.) Litharge 100 grs.; silex 75 grs.; white tartar or potash 10 grs.

VI. Eagle Marine. Paste or strass 10 lbs.; copper highly calcined with sulphur (*copper-stain*) 3 oz.; zaffre 1 scruple.

VII. Emerald.—1. (M. Lançon.) Paste 9612 grs.; acetate of copper 72 grs.; peroxide of iron 1½ grs.—2. (M. Douault-Wiéland.) Paste 4608 grs.; green oxide of copper 42 grs.; oxide of chrome 2 grs.—3. Paste 1 oz.; glass of antimony 20 grs.; oxide of cobalt 3 grs.—4. Paste 15 oz.; carbonate of copper 1 dr.; glass of antimony 6 grs.

VIII. Lapis Lazuli. Paste 10 lbs.; calcined horn or bones 12 oz.; oxides of cobalt and manganese, of each ½ oz.; mix. The golden veins are produced by painting them on with a mixture of gold powder, borax, and gum water, and gently heating till the borax fluxes.

IX. Oriental Garnet. Syn. *Syrian Do. Ancient Carbuncle.*—1. (M. Douault-Wiéland.) Paste 512 grs.; glass of antimony 256 grs.; purple of cassius and oxide of manganese, of each 2 grs. —2. Paste 359 grs.; glass of antimony 178 grs.; oxide of manganese 2 grs.—3. (*Vinegar Garnet.*) Paste 2 lbs; glass antimony 1 lb.; calcined peroxide of iron ½ oz.

X. Opal.—1. (Fontanier.) Paste 1 oz.; horn silver 10 grs.; calcined magnetic ore 2 grs.; absorbent earth (calcined bones) 26 grs.—2. Paste 10 lbs.; calcined bones ½ lb.

XI. Ruby.—1. (M. Douault-Wiéland.)—*a.* Paste 2880 parts; oxide of manganese 72 parts.—*b.* Topaz-paste that has turned out opaque, 1 part; strass 8 parts; fuse for 30 hours, cool, and fuse small pieces before the blowpipe. Very fine.—2. Strass 16 oz.; precipitate of cassius, peroxide of iron, golden sulphuret of antimony, and manganese calcined with nitre, of each 168 grs.; rock crystal 2 oz., or more.—3. Paste 1 lb.; purple of cassius 3 drs.—4. Paste and glass of antimony, of each 8 oz.; purple of cassius 1½ dr.; turns on the orange.

XII. Sapphire.—1. (M. Douault-Wiéland.) Paste 4608 grs.; oxide of cobalt 68 grs.; fuse in a luted Hessian crucible for 30 hours.—2. Paste 8 oz.; oxide of cobalt 49 grs.—3. To the last add a little manganese.

XIII. Topaz. (Douault-Wiéland.)—*a.* Paste 3456 grs.; calcined peroxide of iron 36 grs.—*b.* Paste 1008 grs.; glass of antimony 43 grs.; purple of cassius 1 gr.

XIV. Turquois. Blue paste 10 lbs.; calcined bones ½ lb.

XV Yellow Diamond.—1. Strass 1 oz.; glass of antimony 10 grs.—2. Strass 1 oz.; chloride of silver 24 grs.

Remarks. In the preparation of pastes the ingredients should be separately reduced to the state of fine powder, then well mixed and sifted, and next carefully fused in a clean Hessian crucible, and cooled very slowly, after having been left in the fire for from 24 to 30 hours. The more tranquil and continuous the fusion the greater is the density and beauty of the product. For the finer kinds of mock diamonds, rock crystal should alone be employed; and when sand is used, the purest white variety should be selected, and it should be first digested, and well washed with muriatic acid, and then with water, to remove any traces of earthy matter. The precise minutiæ of the various processes can only be learned by a little experience. See Enamels.

PASTILLES, FUMIGATING. *Syn.* Pastilli odorati. *Prep.* I. (Henry and Guibourt.) Powdered gum benzoin 16 parts; balsam of tolu and powdered sandal wood, of each 4 parts; a light charcoal (Linden) 48 parts; powdered tragacanth and true labdanum, of each 1 part; powdered nitre and gum arabic, of each 2 parts; cinnamon water 12 parts; heat to a smooth ductile mass, form into small cones with a flat tripod base, and dry in the air.

II. (P. Cod.) Benzoin ℥ij; balsam of tolu and yellow sandal wood, of each ℥ss; labdanum ʒj; nitre ʒij; charcoal ℥vj; mix with a solution of gum tragacanth and divide into pastilles as above.

III. (*A la rose.*) Gum benzoin, olibanum in tears, storax in tears, of each 12 oz.; nitre 9 oz.; charcoal 4 lbs.; powder of pale roses 1 lb.; essence of roses 1 oz.; mix with 2 oz. of gum tragacanth dissolved in rose-water 1 quart.

IV. (*A la fleurs d'oranges.*) For powdered roses in the last formula substitute pure orange powder, and for the essence of roses use pure neroli.

V. (*A la Vanille.*) Gum benzoin, storax, and olibanum, (as last,) of each 12 oz.; nitre 10 oz.; cloves 8 oz.; powdered vanilla 1 lb.; charcoal 4 lbs.; oil of cloves ½ oz.; essence of vanilla 7 or 8 oz.

VI. Benzoin ℥ij; cascarilla ʒij; nitre ʒiss; myrrh ʒss; oils of nutmeg and cloves, of each 15 drops; charcoal ℥iij.

Remarks. The above are all of excellent quality, and may be varied to please the fancy of the artist, by the addition or substitution of other perfumes or aromatics. Cheaper pastilles are made by the same formulæ, by increasing the weight of the charcoal and saltpetre. The whole of the ingredients should be reduced to fine powder before mixing them. Musk and civet, so often used in pastilles, should be avoided, as they yield a disagreeable odor when burned. The addition of a little camphor renders them more suitable for a sick chamber. Pastilles are either burned to diffuse a pleasant odor, or to cover disagreeable smells.

PASTILLES, EXPLOSIVE. Fumigating pastilles, containing a little gunpowder. Used to produce diversion.

PATE DE DATTES. *Syn.* Paste of Dates. *Prep.* Dates 1½ lbs.; water 30 pints; boil, clarify, add washed gum senegal 6 lbs., dissolve; add

white sugar 5 lbs.; evaporate without boiling to the consistence of thick honey, stir in orange-flower water 9 oz.; and again gently evaporate; pour it into moulds, finish the drying by a gentle heat in a stove, and then divide it. *Prod.* 9½ lbs. Pectoral. Pâte de gomme Senegal is usually sold for it.

PATE DE GUIMAUVE. *Syn.* PASTA ALTHÆÆ. MARSHMALLOW PASTE. *Prep.* (P. Cod.) Decorticated marshmallow root (French) ℥iv; water ½ gal.; macerate 12 hours, strain, add white sugar and gum arabic, of each 1 lb.; dissolve, strain, evaporate without boiling to the thickness of honey, constantly stirring, and add gradually the whites of 12 eggs, well beaten with orange-flower water, ℥iv, and strained; continue the evaporation and constant stirring till the mass is so firm as not to adhere to the fingers, then proceed as last. It should be very white, light, and spongy. The P. Codex of 1836 omits the marshmallow root, and calls the compound *Pâte de Gomme.* The latter is usually sold in the shops for Pâte de Guimauve. Both are pectoral.

PATE DE GOMME ARABIQUE. *Syn.* GUM ARABIC PASTE. *Prep.* As the last. *** Many persons use, however, twice the above quantity of gum and sugar, but this renders the product less white.

PATE DE GOMME SENEGAL. *Syn.* PASTE OF GUM SENEGAL. *Prep.* As Pâte de dattes, omitting the fruit. It is frequently acidulated with citric or tartaric acid, and flavored with essence of lemons. Pectoral. Sold in the shops for pâte de dattes and pâte de jujubes.

PATE DE JUJUBES. *Syn.* JUJUBES. JUJUBE PASTE. *Prep.* (P. Cod.) Jujubes lb. j; water lb. iv; boil ½ hour, strain with expression, settle, decant the clear, and clarify with white of eggs; add a strained solution of gum arabic lb. vj, in water lb. viij, and to the mixture add white sugar lb. vj; gently evaporate, at first constantly stirring, and afterwards without stirring, till reduced to the consistence of a soft extract, add orange-flower water ℥vj, and place the pan in a vessel of boiling water. In 12 hours carefully remove the scum, pour the matter into slightly oiled tin moulds, and proceed as before. Expectorant; in coughs, &c. Pâte de gomme Senegal is usually sold for it.

PATE DE REGLISSE BLANCHE. *Syn.* WHITE LIQUORICE PASTE. PASTA GLYCYRRHIZÆ ALBA. *Prep.* As pâte de guimauve, substituting liquorice root for marshmallow root.

PATE DE REGLISSE NOIRE. *Syn.* BLACK LIQUORICE PASTE. LIQUORICE JUJUBES. PASTA GLYCYRRHIZÆ NIGRA. *Prep.* (P. Cod.) Refined juice and white sugar, of each 1 lb.; gum arabic lbs.; water 3 quarts; dissolve, strain, evaporate considerably, add finely-powdered orris root ½ oz., oil of aniseed or essence of cedrat a few drops, and pour into moulds as before. Pectoral. *** When made with ¼ the above weight of refined juice it forms *brown liquorice paste,* (pasta glycyrrhizæ fusca.) and by the addition of 15 grs. of extract of opium, the opiated liquorice paste (*pasta glycyrrhizæ opiata*) of the P. Codex.

PATE DE TUSSILAGE A L'ANIS. *Prep.* Strong decoction of coltsfoot flowers 1 quart; Spanish juice ½ lb.; dissolve, strain, evaporate as before, and towards the end add oil of aniseed 1 dr. Pectoral; in coughs, &c.

PEARLS, ROSE. *Syn.* ROSE BEADS. *Prep.* Beat the petals of red roses in an iron mortar for some hours, till they form a black paste, then roll into beads and dry. Hard; take a fine polish; very fragrant.

PEAS, ISSUE. *Syn.* PISA PRO FONTICULIS. *Prep.*—1. Orange berries, or the small unripe fruit of the orange tree, dried, and smoothed by a lathe. —2. Beeswax 1 lb.; turmeric 8 oz.; orris powder 4 oz.; Venice turpentine 3 oz.; mix, and form into peas. *Used* to keep issues open.—3. Beeswax 6 oz.; verdigris, and powdered white hellebore, of each 2 oz.; cantharides 1 oz.; orris powder 1½ oz.; Venice turpentine, q. s.; mix as last. *Used* to open issues.

PECTIC ACID. (From πηκτις, *a coagulum,* because of its jellying property.) A peculiar gelatinous acid substance obtained from carrot roots, from which the juice has been pressed out, by boiling them with one-twenty-fifth part of their weight of carbonate of potash, and 6 times their weight of water, till the liquid becomes gelatinous when neutralized with an acid. A pectate of potassa is formed, from which the acid may be obtained by exactly neutralizing the alkali with a stronger acid; it forms compounds with the bases called *Pectates.*

PECTINE. Vegetable jelly, obtained by adding alcohol to the juice of ripe currants or other fruit, till a gelatinous precipitate forms, which must be drained, washed with a little weak alcohol, and dried.

PEPPER, BLACK. *Syn.* PIPER NIGRUM. This is the dried berries of a tree of the same name. The ground black pepper of the shops is universally adulterated. In fact, I am informed by a most extensive and respectable spice and tea house, that the public taste and judgment are so vitiated, that pure ground pepper is unsaleable. The parties alluded to, originally supplied their customers with unadulterated ground pepper, but in 3 cases out of every 4, it was returned and objected to, on account of its dark color and pungency, which had induced the belief that it was sophisticated. The house alluded to, was therefore compelled by its customers to supply them with an inferior, but milder and paler article. The substances employed to lower black pepper are known in the trade as P. D., H. P. D., and W. P. D. The *first* is the faded leaves of autumn, dried and powdered,—the *second* is the ground husks of black mustard obtained from the mustard mills, and the *third* is common rice finely powdered. The letters are the initials of *pepper dust, hot do.,* and *white do.* I am assured that equal parts of black pepper corns, H. P. D., and W. P. D., form the very best ground pepper sold, and that the ordinary pepper of the shops does not contain more than ⅛th of genuine pepper, or 2 oz. in the pound. —PREPARED BLACK PEPPER is made by steeping the berries for 3 days in 3 times their weight of vinegar, and then drying and grinding them. It is milder than common pepper.

PEPPER, CAYENNE. *Syn.* RED PEPPER. PIPER CAYENNE. *Prep.*—1. Capsicums ground to powder.—2. Capsicum and dry salt, of each 1 lb.; grind together. *** The cayenne of the shops is

commonly a spurious article made by grinding a mixture of any of the reddish woods or sawdust, and enough capsicum to flavor.—*Prepared Cayenne pepper* is the residuum of Cayenne vinegar, essence, or tincture, dried and ground.

PEPPER, CAYENNE, (SOLUBLE.) *Syn.* CRYSTALLIZED SOLUBLE CAYENNE PEPPER. *Prep.* 1. Essence of Cayenne 6 pints, (see page 274;) distil off 3 pints by the heat of a water bath; add dry salt 12 lbs. to the residual liquor, mix well, dry by a gentle heat, color with a little vermilion or jeweller's rouge, and rub it through a sieve.—2. Capsicums 3 lbs.; red sanders wood in shavings 1 lb.; rectified spirits of wine 1 gallon; macerate for 14 days, then express the tincture, filter, distil off one half, add dry salt 15 lbs., mix well, gently evaporate to dryness, and pass it through a coarse sieve as before.—3. For red sanders in the last formula, use Brazil wood. The last two are very superior.—4. As the first form, but color with a strong decoction of saffron instead of vermilion. Very fine, but expensive. Gives a beautiful color to soups, &c. *** The spirit distilled off forms a most suitable menstruum for making essence of cayenne.

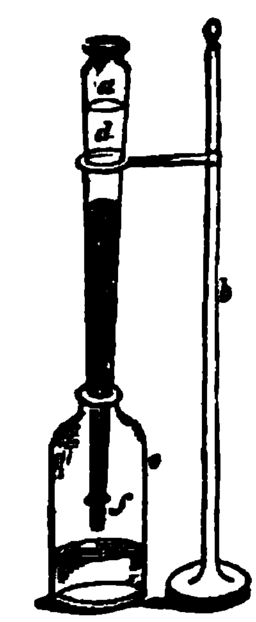
PEPPER, KITCHEN. *Prep.* Ginger 1 lb.; cinnamon, black pepper, allspice, and nutmegs, of each 8 oz.; cloves 1 oz.; dry salt 6 lbs.; grind together. *Useful* to flavor gravies, &c.

PEPSIN. *Prep.* (M. Vogel.) Digest the glandular skin of a hog's stomach, cut into pieces, in cold water for 24 hours, strain and repeat the maceration with fresh water, mix the liquors, precipitate by acetate of lead, diffuse the precipitate through water, decompose by sulphureted hydrogen, again filter, gently evaporate to a sirupy consistence, add absolute alcohol, collect the bulky precipitate that gradually forms, and carefully dry it by exposure to dry air. By the heat of a salt-water bath it forms a white powder, but in this state it loses some of its power of assisting digestion. A *very small* quantity of muriatic acid added to its weak aqueous solution, renders it capable of artificial digestion. (Jour. de Pharm. et de Chim.)

PERCHLORIC ETHER. *Syn.* PERCHLORATE OF OXIDE OF ETHULE. *Prep.* (Hare and Boye.) Triturate a mixture of sulphovinate and perchlorate of baryta, in equivalent proportions, place the powder in a retort connected with a refrigerator and receiver surrounded with ice, and distil by the heat of an oil-bath, gradually raised to from 300° to 340°. *** To prevent an explosion, the ether should be received into a little absolute alcohol; about twice the weight of the sulphovinate employed. It is heavier than water, and explodes by heat, friction, and percussion, and often without any assignable cause. Its explosive power appears to be fully equal to that of the chloride or iodide of azote; but this property is destroyed by solution in alcohol as above. The addition of an equal volume of water to the latter solution immediately separates the ether, which sinks to the bottom of the mixed liquids. It has been suggested that this is the material used by Capt. Warner. Certain it is that an alcoholic solution of a sufficient quantity of this substance to blow up a line-of-battle ship, might safely be carried in the pocket, which is not the case with the chloride or iodide of azote; and this might at any time be exploded by the addition of water, and the slightest friction or percussion. †‡† Not more than 1 to 1½ dr. of the sulphovinate should ever be distilled at a time, and even then the operator should be well protected with a mask and gloves.

PERCOLATION. *Syn.* METHODE DE DEPLACEMENT, (*Fr.*) PERCOLATIO, (*Lat.*, from *percolo*, to filter.) A method of extracting the soluble portion of any substance, by passing the menstruum through it, previously reduced to powder, and packed into a cylinder or other suitable vessel. The "sparging" of the Scotch brewers is an example of this process on the large scale. In pharmacy, the "method of displacement" is frequently adopted for the preparation of tinctures, infusions, &c., and is in some respects superior to digestion or maceration. "The solid materials, usually in coarse, or moderately fine powder, are moistened with a sufficiency of the solvent to form a thick pulp. In twelve hours, or frequently without delay, the mass is put into a cylinder of glass, porcelain, or tinned iron, open at both ends, but obstructed at the lower end by a piece of calico or linen, tied tightly over it as a filter; and the pulp being packed by pressure, ranging as to degree with different articles, the remainder of the solvent is poured into the upper portion of the cylinder, and allowed gradually to percolate. In order to obtain the portion of the fluid which is absorbed by the residuum, an additional quantity of the solvent is poured into the cylinder, until the tincture which has passed through, equals in amount the spirit originally prescribed; and the spirit employed for this purpose is then recovered for the most part, by pouring over the residuum as much water as there is spirit retained in it, which may be easily known by an obvious calculation in each case. The method of percolation is now preferred by all who have made sufficient trial of it to apply it correctly." (P. E.) A simple and useful form of percolator is represented in the engraving. The method of displacement has the advantage of expedition, economy, and yielding products possessing uniformity of strength; but it requires considerable experience to adapt it to all substances. The art rests in properly packing the ingredients in the cylinder, some substances requiring considerable pressure to be used, while others, when even lightly packed, scarcely permit the fluid to pass through them. An excellent plan, applicable to all substances, but especially those of a glutinous or mucilaginous nature, is to mix the powder with

a. Percolator.
b. Stand.
c. Receiver.
d. Menstruum.
e. Substance operated on.
f. Calico strainer.



an equal bulk of well-washed silicious sand, before rubbing it up with the menstruum. The coarseness of the powder must also be attended to. Substances that readily become soft and pappy when wetted by the menstruum, should not be used so fine as those that are more woody and fibrous. The method of displacement answers well for the preparation of all tinctures that are not of a resinous nature, and for most infusions of woody and fibrous substances, as roots, woods, barks, leaves, seeds, insects, &c. It is especially adapted for the preparation of concentrated infusions and essences, as they may thus be obtained of any required strength, without loss, or requiring concentration by heat, which is so destructive to their virtues.

PERIODIC ACID. A new acid, resembling perchloric acid, discovered by Ammermüller and Magnus. It is obtained by mixing pure soda with a solution of iodate of soda, saturating the solution with chlorine gas, collecting the pulverulent white salt that falls, either at once or after concentration, dissolving in dilute nitric acid, and precipitating with nitrate of silver, when a periodate of silver is formed, from which the acid may be obtained. Its salts are called periodates.

PERRY. *Syn.* PYRACEUM. A fermented liquor, prepared from pears in the same way as cider is from apples. The red rough-tasted sorts are principally used for this purpose. The best perry contains about 9§ of absolute alcohol; ordinary perry from 5 to 7§. It is a very pleasant tasted liquor, especially when bottled *à la champagne.*

PERUVINE. A light, colorless, oily liquid, produced along with cinnamate of potash, by boiling cinnameine with alkalis.

PEUCEDANINE. A white crystalline substance, discovered by Schlatter in the root of peucedanum officinale. It is obtained by the action of alcohol.

PEW'S CEMENT. *Prep.* Powdered quicklime 1 part; powdered baked clay 2 parts; mix, then add 1 part of freshly-baked and powdered gypsum to 2 parts of powdered baked clay, and after well mixing, add them to the former powder, and thoroughly incorporate the two. *Used* to cover buildings. It is mixed up with water, and applied like mortar. It acquires great hardness, and is very durable.

PEWTER. *Prep.* I. (Aiken.) Tin 100 parts; antimony 8 parts; copper 4 parts; bismuth 1 part; fuse together. Very fine.

II. (*Plate pewter.*) Tin 100 parts; antimony 8 parts; bismuth and copper, of each 2 parts. Very fine. Used to make plates, &c.

III. (*Trifle.*) Tin 83 parts; antimony 17 parts; some lead is generally added.

IV. (*Ley.*) Tin 4 parts; lead 1 part *Used* for beer pots, &c.

Remarks. According to the report of the French commission, pewter containing more than 18 parts of lead to 82 parts of tin, is unsafe for measures for wine and similar liquors. The legal sp. gr. of pewter in France is 7·764; if it be greater, it contains an excess of lead.

PHLORIDZINE. Obtained by the action of boiling alcohol of 80§ on the fresh bark of the roots of the apple, pear, and plum tree. The alcohol is distilled off, and the phloridzine crystallizes out of the residual liquid. It forms white colorless needles. It may also be obtained by cooling the aqueous decoction of the above barks, but it has then a red color. It is said to be a more powerful febrifuge than quinine (M. Lebandy.) When its solution is boiled with a little dilute sulphuric or muriatic acid, it is converted into grape sugar and *phloretine.*

PHOCENIC ACID. An oily acid, prepared from whale oil, in the same way as the volatile acids from butter. It dissolves in 18 parts of water. Its salts are called *phocenates.*

PHOSPHATE OF LIME, (PRECIPITATED.) *Syn.* CALCIS PHOSPHAS PRECIPITATUM. *Prep.* (P. D.) Bones calcined to whiteness and reduced to powder, 1 part; diluted muriatic acid, and water, of each 2 parts; digest for 12 hours, filter, and precipitate by liquor of ammonia; well wash the precipitate, and dry it. A white, tasteless, odorless powder. *Dose* 10 to 30 grs., in rickets, either alone, or joined with sesquioxide of iron. It is preferable to calcined bones or hartshorn, from being more soluble.

PHOSPHATIC ACID. Obtained by the slow oxidation or combustion of cylinders of phosphorus when exposed to the air. According to Davy it is a mixture of phosphoric and phosphorous acids.

PHOSPHO-MESITYLIC ACID Glacial phosphoric acid dissolved in acetone It forms soluble salts.

PHOSPHORIC ACID. *Syn.* ACIDUM PHOSPHORICUM. *Prep.* Bones calcined to whiteness 3 lbs.; oil of vitriol 2 lbs., diluted with 3 times its weight of water; mix, and digest with heat for 2 or 3 days, adding water to supply the loss by evaporation; then add a large quantity of water, mix well, and strain; wash the residual matter with hot water, mix the liquors, add ammonia in slight excess, filter, evaporate, and ignite the dry mass in a platinum crucible.

Remarks. Phosphoric acid properly exists only in solution, for by the heat applied as above, it is converted into *metaphosphoric acid,* but by solution in water and ebullition for a few minutes, it is reconverted into phosphoric acid. In the dry or glacial state it is a colorless, glassy-looking substance, soluble in water, yielding a solution which exhibits strong acid properties. It is remarkable for its proneness to form subsalts with the alkalis and earths, in which 1 atom of acid is united with 3 at. of base. Its salts are called *phosphates.* Phosphoric acid, when neutralized with an alkali, is characterized by giving with the soluble salts of lead, lime, and baryta, white precipitates soluble in nitric acid, and with solution of nitrate of silver a yellow precipitate. It is distinguished from arsenious acid by not being affected by sulphureted hydrogen. The insoluble phosphates may be tested by first treating them with sulphuric acid, filtering, and neutralizing the solution with an alkali before applying the reagents. If a soluble phosphate be heated to redness, it is converted into a *pyrophosphate,* and will then give a *white* precipitate with nitrate of silver.

PHOSPHORIC ACID, (DILUTE.) *Syn.* ACIDUM PHOSPHORICUM DILUTUM. *Prep.* (P. L.) Nitric acid f℥iv; water f℥x; mix, add phosphorus ℥j, place the retort in a sand-bath, and apply heat

till f℥viij are distilled, which are to be rejected. Evaporate the remaining liquid in a platinum crucible to ℥ij ʒvj; cool, and add as much distilled water as will make the whole quantity measure f℥xxviij.

Remarks. This is a colorless, sour liquid, having the sp. gr. 1·064. By heat it yields glacial phosphoric acid.

Dose. 10 drops to ʒj; largely diluted with water, in phosphatic urinary deposites, ossification of the arteries, caries, &c.

PHOSPHOROUS ACID. *Syn.* Acidum Phosphorosum. *Prep.* Sublime phosphorus through powdered bichloride of mercury, contained in a glass tube. Chloride of phosphorus comes over, which, on being mixed with water and evaporated to a sirup, forms a crystalline mass of hydrated phosphorous acid on cooling. It is a powerful deoxydizing agent. With the bases it forms salts called *phosphites.*

PHOSPHORUS. (From φῶς, *light*, and φέρω, *I carry*, because of its luminous appearance in the dark.) An elementary inflammable substance, discovered by Brandt in 1669.

Prep. (Ure.) Ground bone-ash 1 cwt.; water 2 cwt.; mix to a pap in a large tub, and add in a slender stream (still stirring) oil of vitriol 78 lbs.; work well together, adding more water if required; in 24 hours thin with water, agitate well, and if convenient heat the mixture in a leaden pan, and as soon as the paste has lost its granular character, transfer it into a series of tall casks; largely dilute with water, and after settling, decant the clear portion; wash the residue well with water, mix the clear liquids, and evaporate in a copper or lead pan, till the calcareous deposite becomes considerable, then cool, decant the clear, and drain the sediment on a filter; evaporate the clear liquid to the consistence of honey, add 9 lbs. of powdered charcoal, and evaporate to dryness in an iron pot, or till the bottom of the latter becomes red hot; the dry mixture, when cold, is put into earthen retorts well covered with luting and properly dried, and heat is applied sideways rather than at the bottom, by means of an air furnace. The beak of the retort is connected with a copper tube, the other end of which is made to dip about ¼ of an inch beneath the surface of lukewarm water placed in a trough or wide-mouthed bottle. The distilled product is purified by squeezing it through chamois leather under warm water, and is then moulded for sale by melting it under water, plunging the wider end of a slightly tapering but straight glass tube into the water, sucking this up to the top of the glass, so as to warm and wet it, next immersing the end into the liquid phosphorus, and sucking it up to any desired height. The bottom of the tube being now closed with the finger, it is withdrawn, and transferred to a pan of cold water to congeal the phosphorus, which will then commonly fall out, or may be easily expelled by pressure with a piece of wire. (See Ure's Dict. of Arts, &c.)

Remarks. Phosphorus is a pale yellow, semitransparent, and highly combustible solid; sp. gr. 1·77; melts at 108°; and unites with oxygen, forming *acids*, and with the metals, forming *phosphurets.* It is soluble in ether, naphtha, and the oils. From its great inflammability it can only be safely kept under water. In commerce it is always packed in tin cylinders, soldered air-tight. It is a powerful corrosive poison; but small doses of its ethereal or oily solution have been administered in some complaints. *** Baldwin's Phosphorus is ignited muriate of lime,—*Canton do.*, oyster shells calcined with sulphur,—*Bologna do.*, calcined sulphate of baryta,—*Homberg's do.*, ignited chloride of calcium. All these phosphoresce in the dark, after exposure to the solar rays.

PHOSPHORUS BOTTLES. *Syn.* Briquets Phosphoriques. *Prep.* Phosphorus 1 dr.; white wax 15 or 20 grs.; cautiously melt together in a vial, by the heat of warm water, and as it begins to cool turn the bottle round, so that the mixture may adhere to the sides. *Used* as instantaneous light bottles. A sulphur match rubbed against the phosphorus and withdrawn into the air, immediately inflames. *** The vial should only be unstoppered at the instant of introducing the match, and should be handled with caution.

PHOSPHORUS, BROMIDE OF. When bromine and phosphorus are brought into contact in a vessel filled with carbonic acid gas, they unite with the evolution of light and heat, forming a crystalline yellow *perbromide*, which sublimes and condenses in the upper part of the flask, and a liquid *protobromide*, which remains at the bottom.

PHOSPHORUS, CHLORIDES OF.—1. (*Perchloride.*) A volatile white substance, obtained by the spontaneous combustion of phosphorus in chlorine.—2. (*Sesquichloride.*) A limpid fluid, a little heavier than water, obtained by passing the vapor of phosphorus through corrosive sublimate contained in a glass tube.

PHOSPHORUS, IODIDES OF.—1. (*Protiodide.*) Obtained by mixing 1 part of phosphorus with 7 or 8 of iodine in a close vessel. Orange colored.—2. (*Sesquiodide.*) As last, from 1 part of phosphorus and 12 of iodine. A dark gray crystalline mass.—3. (*Periodide.*) Phosphorus 1 part; iodine 20 parts; as last. Black.

PHOSPHURETED HYDROGEN. *Prep.* —1. Fill a small tubulated retort with water acidulated with muriatic acid, throw in some small lumps of phosphuret of lime, and receive the evolved gas in an inverted jar over water. ½ oz. of phosphuret of lime yields 70 cubic inches of gas.—2. Boil phosphorus in a solution of potassa, or in milk of lime. *** Phosphureted hydrogen is a colorless gas, spontaneously inflaming by contact with air. It has a remarkably fetid odor.

PICAMAR. A bitter oil discovered in tar by Reichenbach. (See Creosote.)

PICCALILLY. *Syn.* Indian Pickle. *Prep.* White cabbages sliced, cauliflowers pulled to pieces and scalded, radishes topped and tailed, French beans, celery in three-inch lengths, shoots of elder peeled, clusters of elder-flowers unopened, all salted for 2 or 3 days, then mixed with apples and cucumbers sliced, and a large proportion of ginger, garlic, turmeric, long pepper, and mustard seed, as the pickle is expected to be very warm; the vinegar must also be the strongest that can be procured, and just sufficient to float the articles; any other vegetables may be used at pleasure.

PICKLE, LEMON. *Prep.* I. Lemon juice and vinegar, of each 3 gallons; bruised ginger 1 lb.; allspice, pepper, and grated lemon peel, of each 8 oz.; salt 3½ lbs.; cayenne 2 oz.; mace and nutmegs, of each 1 oz.; digest

II. Lemons sliced, 1 dozen; salt 2 lbs.; garlic 2 cloves; scraped horseradish, and flour of mustard, of each 4 oz.; cloves, mace, nutmegs, and cayenne pepper, of each ½ oz.; vinegar 1 gallon; as before. Used as a sauce.

PICKLE, MEAT. *Prep.* Moist sugar 2 lbs.; bay or common salt 4 lbs.; saltpetre ½ lb.; fresh ground allspice 2 oz.; water 6 to 8 quarts; dissolve. *Used* to pickle meat, to which it imparts a fine red color, and a superior flavor.

PICKLES. In the preparation of pickles, it is highly necessary to avoid employing metallic vessels; as both vinegar and salt corrode brass, copper, lead, &c., and thus become poisonous. When it is necessary to heat or boil vinegar, it should be done by placing it in a stoneware jar in a water-bath, or on a stove. Glazed earthenware should be avoided either for making or keeping the pickles in, as the glazing usually contains lead. Pickles should be kept from the air as much as possible, and only touched with wooden spoons. They are also better preserved in small jars, or bottles, than large ones, as the more frequent opening of the latter exposes them too much. Copper or verdigris is frequently added to pickles to impart a green color, but this *poisonous* addition may be readily detected. If a green color be desired, it may be imparted by steeping vine leaves, or the leaves of parsley or spinage in the vinegar. A teaspoonful of olive oil is frequently added to each bottle to keep the pickles white. The following is an example of pickling:—

PICKLED GHERKINS. Steep them in strong brine for a week, then pour it off, heat it to the boiling point, and again pour it on the gherkins; in 24 hours drain the fruit on a sieve, put it into wide-mouthed bottles or jars, fill them up with strong pickling vinegar, boiling hot, bung down immediately, and tie over with bladder. When cold, dip the corks into melted bottle wax. Spice is usually added to the bottles, or else steeped in the vinegar.

*** In a similar way are pickled, *onions, mushrooms, cucumbers, walnuts, samphires, green gooseberries, cauliflowers, melons, barberries, peaches, lemons, tomatoes, beans, radish pods, codlins, red cabbage,* (without salt, and with cold vinegar,) *beet-root,* (without salting,) *garlic, peas,* &c., &c., observing that the softer and more delicate articles do not require so long soaking in brine as the harder and coarser kinds, and may be often advantageously pickled by simply pouring very strong pickling vinegar over them, without applying heat.

PICROLICHENINE. A bitter, crystallizable substance, found by Alms in the lichen variolaria amara. It is extracted by alcohol, and purified by washing with a weak solution of carbonate of potash. It is said to be a powerful febrifuge.

PICROMEL. A name given by Thénard to a black bitter substance obtained from fresh bile, by adding sulphuric acid diluted with 5 parts of water, applying a gentle heat, and after repose, decanting the clear, edulcorating the sediment (resin of bile) with water, digesting with carbonate of baryta, and evaporating.

PICROTOXINE. *Syn.* Picrotoxia. Picrotoxic Acid. A bitter, crystallizable, and poisonous substance, discovered by Boullay in cocculus indicus. It is soluble in boiling water, alcohol, ether, and acetic acid. It may be obtained by precipitating the decoction of cocculus indicus by acetate of lead, evaporating to dryness, and frequently redissolving in alcohol of 0·817.

PILES. *Syn.* Hæmorrhoides. A painful disease occasioned by the morbid dilatations of the veins at the lower part of the rectum, and surrounding the anus. Piles are principally occasioned by costiveness and cold. They have been distinguished into—*blind piles*, or a varicose state of the veins without bleeding,—*mucous piles*, when the tumors are excoriated, and mucus or pus is discharged,—*bleeding piles*, when accompanied with loss of blood,—*excrescential piles*, when there are loose, fleshy excrescences about the verge of the anus and within the rectum. The treatment consists in the administration of mild aperients, as castor oil, or an electuary of sulphur and cream of tartar; when there is much inflammation or bleeding, cold and astringent lotions, as those of sulphate of zinc or alum, should be applied, and when the pain is considerable, fomentations of decoction of poppy heads may be used with advantage. To arrest the bleeding, ice is also frequently applied, but continued pressure is more certain. When the tumors are large and flaccid, the compound ointment of galls is an excellent application, and if there is a tendency to inflammation, a little liquor of diacetate of lead may be added. In confirmed piles, the internal use of copaiba, or still better, of the confection of black pepper, should be persevered in, together with local applications. In severe cases, the protruded tumors are removed by surgeons, by the knife or ligature.

PILLS. *Syn.* Pilulæ, (*Lat.*) Pills are too well known to require description. This form of medicine is particularly adapted to the exhibition of nauseous substances, and such as operate in small doses. Extracts may be made into pills either alone or with the addition of any simple powder, as that of liquorice, to increase their consistence. Powders are usually beaten up with sirup, treacle, mucilage, conserve of roses, or extract of liquorice. Castile soap is frequently used for substances that are not decomposed by alkalis. When the mixed ingredients are made into a mass, it should be preserved in a bladder placed in a covered stone pot, and should be occasionally moistened with a little spirit, or spirit and water, to prevent it getting hard. In all cases, the dry ingredients should be reduced to fine powder, and the whole beaten into a uniform mass of a proper consistence for rolling into pills. *** Pills are gilded and silvered by rolling them between the fingers slightly moistened with mucilage, and then shaking them up in a small gallipot covered with a piece of paper, along with a little gold or silver leaf, or a little powdered gold or silver. In ordinary cases, rolling the pills in carbonate of magnesia, or powdered starch, is usually adopted to prevent them sticking together while moist. As pill masses are liable to get hard and brittle by keeping, an excellent plan is to keep the dry ingredients powdered and mixed together in well-corked bottles or jars, when a portion may at any time be beaten up with sirup, conserve, soap, &c., according to the formula, and as wanted for use.

PILLS, ACETATE OF LEAD. *Syn.* Pilu-

læ plumbi opiatæ. *Prep.* (P. E.) Acetate of lead 6 parts; opium and conserve of red roses, of each 1 part; mix, and divide into 4-gr. pills. In spitting of blood, obstinate diarrhœa, dysentery, &c. *Dose.* 1 to 3 pills two or three times a day, washed down with water soured with vinegar.

PILLS, ALOES. *Syn.* Pilulæ Aloes. *Prep.* (P. E.) Powdered Socotrine aloes and Castile soap, equal parts; conserve of red roses q. s. to make a mass.

PILLS, ALOES, (COMPOUND.) *Syn.* Pil. Aloes compositæ. *Prep.* (P. L. and D.) Powdered Socotrine aloes (hepatic, P. D.) ℥j; extract of gentian ℥ss; oil of caraway 40 drops; sirup (if required) q. s.; beat to a mass. *Dose.* 5 to 10 grs., as a purgative in habitual costiveness.

PILLS, ALOES AND ASAFŒTIDA. *Syn.* Pil. Aloes et Asafœtidæ. *Prep.* (P. E.) Powdered aloes, asafœtida, and Castile soap, equal parts; conserve of red roses q. s.; beat into a mass. *Dose.* 5 to 10 grs., as a purgative in dyspepsia, flatulence, &c.

PILLS, ALOES AND IRON. *Syn.* Pil. Aloes et Ferri. *Prep.* (P. E.) Sulphate of iron 3 parts; Barbadoes aloes 2 parts; aromatic powder 6 parts; conserve of red roses 8 parts; mix, and divide into 5-gr. pills. Emmenagogue. *Dose.* 1 to 3 pills in chlorosis and atonic amenorrhœa.

PILLS, ALOES AND MYRRH. *Syn.* Pil. Aloes et Myrrhæ, (P. E.) Pil. Aloes cum Myrrha, (P. L. and D.) Pil. Rufi. Rufus's Pills. Pil. communes. Common Pills. *Prep.* —1. (P. L.) Aloes ℥ij; saffron and myrrh, of each ℥j; sirup to mix.—2. (P. E.) Socotrine or East Indian aloes 4 parts; myrrh 2 parts; saffron 1 part; conserve of red roses q. s. A most excellent stomachic, purgative, and emmenagogue, where there are no febrile symptoms. *Dose.* 10 to 20 grs.

PILLS, ALOES AND ROSE JUICE. *Syn.* Pil. Aloes Rosatæ. Pilules angeliques. Grains de Sante. *Prep.* Aloes and rose juice, of each ℥iv; juices of borage and chicory, of each ℥ij; dissolve, evaporate to an extract, add rhubarb ʒij; agaric ʒj; and divide into 1½-gr. pills. *Dose.* 4 to 12, as a purge.

PILLS, AMMONIATED COPPER. *Syn.* Pil. cupri ammoniati. *Prep.* (P. E.) Ammonio-sulphate of copper 1 part; bread-crumb 6 parts; solution of carbonate of ammonia q. s. to make a pill mass; divide so that each pill may contain ½ gr. of ammoniated copper. *Dose.* 1 pill night and morning, gradually increased to 5 or 6, in epilepsy, and some other spasmodic diseases.

PILLS, ANTIBILIOUS. See the various purgative and stomachic Pills.

PILLS, ANTI-EPILEPTIC. *Prep.* 1.—(Récambier.) Aqueous extract of opium 5 centigrammes; acetate of lead 20 do.; powdered henbane 40 do.; gum sirup q. s.; mix, and divide into 8 pills. *Dose.* 1 night and morning.—2. (Leuret.) Extracts of stramonium and belladonna, of each 1 gramme; camphor and opium, of each 50 centigr.; divide into pills of 10 decigr. *Dose.* 1 a day, gradually and cautiously increased to 10 or 12, or more.

PILLS, ANTISPASMODIC. *Prep.* (Thomson.) Opium 1 gr.; castor 13 grs.; powdered digitalis 2 grs.; sirup to mix; divide into 4 pills. *Dose.* 1 or 2 two or three times a day in spasmodic asthma, &c.

PILLS, ASAFŒTIDA. *Syn.* Pil. asafœtidæ. *Prep.* (P. E.) Asafœtida, galbanum, and myrrh, of each 3 parts; conserve of red roses 4 parts, or q. s.; beat into a mass. Stimulant and antispasmodic. *Dose.* 10 to 20 grs., in hysteria, &c.

PILLS, ASTRINGENT. *Prep.* 1. (Collier.) Nitrate of silver 3 grs.; extract of opium ʒss; musk ℈j; camphor ℈ij; mix for 48 pills. *Dose.* 1 pill 2 or 3 times a day, as a stimulant tonic; in epilepsy, &c.—2. (Cavarra.) Pure tannin 6 grs.; powdered gum 12 grs.; sugar ʒj; sirup to mix; divide into 4-gr. pills. *Dose.* 1 to 3 in diarrhœa.—3. Acetate of lead 3 grs.; opium 1 gr.; divide into 3 pills. *Dose.* 1 twice a day, followed by a glass of water acidulated with vinegar; in colliquative diarrhœa, chronic dysentery, phthisical night-sweats, internal hemorrhages, &c.

PILLS, CALOMEL AND OPIUM. *Syn.* Pil. calomelanos et opii. *Prep.* (P. E.) Calomel 3 parts; opium 1 part; conserve of red roses to mix. Divide so that each pill may contain 2 grs. of calomel. *Dose.* 1 or 2 in rheumatism, and some inflammatory affections; if continued, they induce salivation.

PILLS, CALOMEL, (COMPOUND.) *Syn.* Plummer's Pills. Red Pill. Pil. hydrargyri chloridi comp., (P. L.) Pil. Calomelanos comp., (P. E. & D.) Pil. hydrargyri submuriatis, (P. L. 1809.) Pil. Plummeri. *Prep.* (P. L.) Calomel, oxysulphuret of antimony, and treacle, of each ʒij; powdered guaiacum resin ʒss; mix. An excellent alterative pill in chronic skin diseases and liver affections; in dyspepsia, syphilis, &c. *Dose.* 5 to 10 grs.

PILLS, CATHARTIC. *Prep.* 1. (Thomson.) —*a.* Scammony 4 grs.; extract of taraxacum 16 grs.; divide into 6 pills. *Dose.* 3 twice a day, in hypochondriasis, and chronic inflammation of the liver.—*b.* Calomel 3 grs.; powdered jalap 9 grs.; mucilage to mix; for 3 pills. *Dose.* 2 or 3 at night to empty the bowels, in bilious affections. —2. (Collier.) Calomel 10 grs.; powdered jalap and rosepink, of each ℈iv; oil of caraway 10 drops; sirup of buckthorn to mix; divide into 5-gr. pills. *Dose.* 1 to 3, as a purgative.—3. Compound extract of colocynth ʒj; powdered opium 3 grs.; powdered scammony 15 grs.; oil of nutmeg 8 drops; divide into 18 pills. *Dose.* 2 to 4, as a purge.—4. Socotrine aloes ʒj; rhubarb ℈ij; scammony ʒss; capsicum 10 grs; oil of cloves 10 drops; mix, and divide into 48 pills. *Dose.* 2 to 4 at bedtime.

PILLS, CATHARTIC, (COMPOUND.) *Syn.* Pil. catharticæ compositæ. *Prep.* (P. U. S.) Compound extract of colocynth ℥ss; powdered extract of jalap and calomel, of each ʒiij; powdered gamboge ℈ij; mix, and divide into 180 pills. An excellent purgative pill, especially in bilious affections. *Dose.* 1 to 3 pills.

PILLS, COLOCYNTH. *Syn.* Pil. colocynthidis, (P. E. & D.) Pil. cochiæ. Pil. cocciæ. Pil. cochiæ minores. *Prep.* (P. E.) Socotrine or East Indian aloes and scammony, of each 8 parts; colocynth 4 parts; sulphate of potash and oil of cloves, of each 1 part; rectified spirit (mucilage, P. D.) q. s. to form a mass; divide into 5-gr pills. An excellent purgative pill. *Dose.* 5 to 15

grs. 4 grs. of this pill, combined with 2 or 3 grs. of mercurial pill, and taken over night, is an excellent remedy in bilious attacks. *** The pil. cochiæ of Apothecaries' Hall is the above pill, without the sulphate of potash, and beaten up with sirup or treacle, instead of mucilage. The common pil. cochiæ of the shops is generally made as follows:—Powdered aloes 1½ lb.; do. colocynth ¾ lb.; do. jalap 6 oz.; oil of cloves 1½ oz.; sirup or treacle to mix. *Prod.* About 4¾ lbs. The more conscientious sometimes add to the above scammony 6 oz.

PILLS, COLOCYNTH AND HENBANE. *Syn.* PIL. COLOCYNTHIDIS ET HYOSCYAMI. *Prep.* (P. E.) Compound colocynth pill mass ʒij; extract of henbane ʒj; mix, and divide into 36 pills. *Dose.* 5 to 15 grs., as an anodyne purgative.

PILLS, COPAIBA. *Syn.* PIL. COPAIBÆ CUM MAGNESIA. *Prep.* (Mialhe.) Pure balsam of copaiba ℥j; calcined magnesia ʒss; mix, and stir for some days till sufficiently thick. For present use copaiba requires its own weight of magnesia; Dr. Pereira orders copaiba ℥j; magnesia ʒvj or ʒvij. *Dose.* 10 to 30 grs., frequently in diseases of the mucous membranes of the urinary organs.

PILLS, DIAPHORETIC. *Prep.* 1. Antimonial powder ʒss; opium ℈ss; calomel 5 grs.; confection of opium to mix; divide into 10 pills. *Dose.* 1 at bedtime.—2. Guaiacum 10 grs.; emetic tartar and opium, of each 1 gr.; simple sirup to mix; divide into 3 pills. *Dose.* 1 or 2.—3. Camphor and antimonial powder, of each ʒss; opium 10 grs.; aromatic confection q. s. to mix; divide into 12 pills. *Dose.* 1 pill.—4. Powdered guaiacum 10 grs.; compound powder of ipecacuanha 5 grs.; confection of roses to mix; for a dose. All the above are taken as diaphoretics in inflammatory affections.

PILLS, DINNER. *Prep.* 1. (*Lady Crespigny's Pills. Lady Webster's Pills. Grains de vie. Grains de mente. Stomachic Pills. Pil. Aloes cum mastiche.*) Aloes ʒvj; mastich and red roses, of each ʒij; sirup of wormwood to mix; divide into 3-gr. pills. They produce a bulky and copious evacuation.—2. Substitute rhubarb for the roses in the last.—3. (*Pil. stomachicæ mesues. Pil. dictæ antecibum,* P. Cod.) Aloes ʒvj; extract of bark ʒiij; cinnamon ʒj; sirup of wormwood to mix. *Dose.* Of either of the above 5 grs., 1 hour before dinner, to promote the appetite; as a purge, 10 to 15 grs.

PILLS, DIURETIC. *Prep.* (Thomson.)—*a.* Powdered digitalis 12 grs.; calomel and opium, of each 4 grs.; confection of roses q. s. for 12 pills.—*b.* Mercurial pill ʒj; powdered squills ℈j; confection of roses q. s. for 20 pills. *Dose.* 1 of either of the above twice a day in dropsy.

PILLS, DIXON'S ANTIBILIOUS. *Prep.* Aloes, scammony, rhubarb, and a little tartar emetic, beat up with sirup.

PILLS, EXPECTORANT. *Prep.*—1. Myrrh ʒiss; powdered squills ʒss; extract of henbane ʒij; sirup q. s.; divide into 30 pills. *Dose.* 2 night and morning.—2. (Thomson.) Powdered squills and extract of hemlock, of each ʒss; ammoniacum ʒiss; divide into 30 pills. *Dose.* 2 twice a day. In chronic coughs, asthma, &c.

PILLS, FAMILY. *Syn.* ALOE PILLS. ANTIBILIOUS DO. ALOE ROSATA. *Prep.* Socotrine or hepatic aloes 4 oz.; juice of roses 1 pint; dissolve by heat, strain through a piece of coarse flannel, evaporate, and form into pills. Purgative, in doses of 5 to 15 grs.

PILLS, FOTHERGILL'S. Aloes, scammony, colocynth, and diaphoretic antimony.

PILLS, FOXGLOVE AND SQUILLS. *Syn.* PIL. DIGITALIS ET SCILLÆ. *Prep.* (P. E.) Powdered foxglove and squills, of each 1 part; aromatic electuary (P. E.) 2 parts; conserve of red roses q. s.; divide into 4-gr. pills. A valuable diuretic in dropsies. *Dose.* 1 to 2 pills.

PILLS, FULLER'S. *Prep.* Aloes ʒss; senna and myrrh, of each ℈j; asafœtida and galbanum, of each 10 grs.; saffron and mace, of each 5 grs.; sulphate of iron ℈ij; sirup q. s. *Dose.* 5 to 20 grs.; as an antispasmodic and aperient.

PILLS, GALBANUM, (COMPOUND.) *Syn.* PIL. GUMMOSÆ. PIL. GALBANI COMP., (P. L. & D.) *Prep.* (P. L.) Galbanum ℥j; myrrh and sagapenum, of each ℥iss; asafœtida ℥ss; sirup (treacle, P. D.) q. s.; beat to a mass. Stimulant and antispasmodic. *Dose.* 10 to 20 grs.; in hysteria, amenorrhœa, &c.

PILLS, GAMBOGE. *Syn.* PIL. CAMBOGIÆ, (P. E.) PIL. CAMBOGIÆ COMP. (P. L. & D.) FORDYCE'S PILLS. *Prep.* (P. L.) Gamboge ʒj; aloes ʒiss; ginger ʒss; Castile soap ʒij; beat to a mass. An active cathartic. *Dose.* 10 to 15 grs. in obstinate constipation.

PILLS, HEMLOCK, (COMPOUND.) *Syn.* PIL. CONII COMP. *Prep.* (P. L.) Extract of hemlock ʒv; ipecacuanha ʒj; mix. Antispasmodic, expectorant, and narcotic. *Dose.* 5 to 10 grs. twice or thrice a day, in spasmodic coughs, bronchitis, incipient consumption, &c.

PILLS, HOFFMAN'S, (MAJOR.) *Syn.* PIL. HYDRARGYRI BICHLORIDI. PIL. HOFFMANII MAJORES. *Prep.* (Paris.) Corrosive sublimate and muriate of ammonia, of each 5 grs.; water fʒss; triturate till dissolved, add honey ʒss, liquorice powder ℈vj; mix, and divide into 40 pills. Each pill contains ⅛ gr. of corrosive sublimate.

PILLS, HOOPER'S. *Prep.* Sulphate of iron, and water, of each 8 oz.; dissolve, add Barbadoes aloes 2½ lbs.; white canella 6 oz.; myrrh 2 oz.; opopanax ½ oz.; make a mass; divide each drachm into 18 pills, and put 40 into each box.

PILLS, HYDRAGOGUE. *Syn.* BONTIUS' PILLS. PIL. HYDRAGOGÆ. *Prep.* (P. Cod.) Aloes, gamboge, and ammoniacum, of each ℥j; vinegar ℥vj; dissolve, strain, evaporate, and divide into gr. pills. Strongly cathartic. Used in dropsy.

PILLS, IODIDE OF MERCURY. *Syn.* PIL. HYDRARGYRI IODIDI. *Prep.* Protiodide of mercury, and ginger, of each ʒj; confection of hips ʒiij; mix. *Dose.* 5 to 15 grs., in scrofula, &c.

PILLS, IPECACUANHA, (COMPOUND.) *Syn.* PIL. IPECACUANHÆ COMP., (P. L.) PIL. IPECAC. ET OPII, (P. E.) *Prep.* (P. L.) Compound powder of ipecacuanha ʒiij; powdered squills and ammoniacum, of each ʒj; mucilage q. s. to mix. Narcotic, sudorific, and expectorant. *Dose.* 5 to 15 grs., in chronic coughs, asthma &c.

PILLS, JAMES'S ANALEPTIC. *Prep.* Antimonial powder, guaiacum, and pills of aloes and myrrh, equal parts; sirup q. s.; mix, and divide into 4-gr. pills. A diaphoretic purgative.

PILLS, IRON, (COMPOUND.) *Syn.* Female Pills. Pil. Ferri comp., (P. L.) Pil. Ferri Carbonatis, (P. E.) Pil. Ferri cum Myrrha. *Prep.*—1. (P. L.) Myrrh ʒij; carbonate of soda ʒj; triturate, add sulphate of iron ʒj; again triturate, then add treacle ʒj; and beat together in a warm mortar.—2. (P. E.) Saccharine carbonate of iron 4 parts; conserve of red roses 1 part; mix, and divide into 5-gr. pills. Both the above are mild chalybeate tonics. *Dose.* 10 to 20 grs.

PILLS, IRON, (SULPHATE.) *Syn.* Pil. Ferri Sulphatis. *Prep.* (P. E.) Dried sulphate of iron 2 parts; extract of dandelion 5 parts; conserve of red roses 2 parts; liquorice powder 3 parts; mix, and divide into 5-gr. pills. Tonic. *Dose.* 1 to 3 pills.

PILLS, KEYSER'S. *Prep.* Acetate of mercury 12 grs.; manna ʒiss; starch 6 grs.; mucilage of gum tragacanth to mix; divide into 6-gr. pills. Alterative. *Dose.* 2 night and morning, gradually increased, in syphilis, &c.

PILLS, KITCHENER'S. *Syn.* Pil. Rhei et Carui. Kitchener's Peristaltic Persuaders. *Prep.* Turkey rhubarb ʒij; sirup ʒj; oil of caraway 10 drops; mix, and divide into 40 pills. Stomachic, aperient. *Dose.* 3 to 6.

PILLS, LOCKYER'S. *Prep.* Panacea of antimony 10 grs.; white sugar ℥j; mucilage to mix; divide into 100 pills. Cathartic and emetic. *Dose.* 1 to 3 pills.

PILLS, MERCURIAL. I. (*Blue Pill. Pil. Cæruleæ. Pil. Hydrargyri*, P. L. E. and D. *Pil. Mercuriales*, P. L. 1745.) *Prep.* (P. L.) Mercury ʒij; confection of red roses ʒiij; triturate till the globules are perfectly extinguished, then add liquorice powder, ʒj, and beat into a pill mass. The Edinburgh and Dublin forms are similar; the former orders it to be divided into 5-gr. pills. *** This pill, if well prepared, presents no globules of mercury when moderately rubbed on a piece of white paper, but immediately communicates a white stain to gold. It should possess considerable density, and have a dark blue or slate color. It should contain ⅓ mercury, which may be ascertained from its sp. gr., or more exactly by an assay for the metal. (See Sevum.) *Dose.* As an alterative, 1 to 3 grs., combined with opium; as a purgative, 5 to 15 grs. A blue-pill over night, and a black draught in the morning, is a popular remedy in bilious complaints. (See Abernethy Medicine.)

II. (Collier.) Mercury and sesquioxide of iron, of each ʒj; confection of red roses ʒiij; triturate as before. This has been proposed as an excellent substitute for the common mercurial pill. The addition of only a few grs. of the above oxide of iron to 1 oz. of conserve, renders it capable of rapidly killing a large quantity of mercury.

III. (Tyson.) Blue oxide of mercury (prepared by decomposing calomel with liquor of potassa, to which a little liquor of ammonia has been added) ʒij; confection of roses ʒvj; powdered chamomiles ʒj; mix. Also proposed as a substitute for the College pill. (Pharm. Jour.)

IV. Stearine ʒj; rub in a warm mortar till it assumes the consistence of thick cream, then add mercury ʒiv; rub till "killed," and further add confection of roses and wheat flour, of each ʒiij; powdered gum ʒj. (Pharm. Jour.) Another proposed substitute for the College pill.

V. (*Pil. Hydrargyrosæ*, P. Cod.) Mercury and honey, of each ʒvj; triturate till the globules are extinguished, then add aloes ʒvj; rhubarb ℥ij; scammony ʒij; black pepper ʒj; make a pill mass. Contains ¼ mercury. Alterative and aperient. *Dose.* 5 to 10 grains. *Belloste's*, *Barberousse's*, and *Morelot's pills*, and the *Pil. Hydrargyri laxantes*, (P. E. 1744,) and the *Pil. Mercuriales*, (P. L. 1746,) are similar.

PILLS, MORRISON'S. *Prep.*—1. (*Morrison's Pills, No.* 1.) Aloes and cream of tartar, equal parts; mucilage q. s. to form a pill mass.—2. (*Morrison's Pills, No.* 2.) Gamboge ʒij; aloes ʒiij; colocynth ʒj; cream of tartar ʒiv; sirup to mix. Both the above are purgative; the latter strongly so. *Dose* of either, 5 to 15 grs.

PILLS, NAPOLEON'S PECTORAL. *Prep.* Ipecacuanha 30 grs.; powdered squills and ammoniacum, of each 40 grs.; mucilage to mix; divide into 24 pills. It is said that the above was a favorite remedy with the late emperor of France for difficulty of breathing, bronchitis, and various affections of the organs of respiration. *Dose.* 2 pills night and morning.

PILLS, OPIUM. *Syn.* Night Pills. Anodyne do. Opiate do. Pil. Opii sive Thebaicæ, (P. E.) Opium and conserve of red roses, of each 1 part; sulphate of potash 3 parts; mix, and divide into 5-gr. pills. *Dose.* 1 or 2 pills, as an anodyne or soporific. Each pill contains 1 gr. of opium.

PILLS, OPIUM AND SOAP. *Syn.* Compound Soap Pills. Laudanum, (P. L. 1720.) Pil. Saponaceæ, (P. L. 1745.) P. Opii, (P. L. 1788.) P. Saponis cum Opio, (P. L. 1809, 1824, & P. D.) Pilulæ Saponis compositæ, (P. L. 1836.) *Prep.* (P. L.) Powdered opium ℥ss; Castile soap ℥ij; beat together. An excellent anodyne and soporific. *Dose.* 3 to 10 grs. Contains one-fifth dry opium.

PILLS, PECTORAL. *Prep.* (Haggart.) Powdered ipecacuanha, and squills, of each ℈iv; acetate of morphia 16 grs.; Castile soap ℥j; mix, and divide into 192 pills. A most excellent pectoral. *Dose.* 1 to 3, twice or thrice daily.

PILLS, PETER'S. *Prep.* Aloes, jalap, scammony, and gamboge, of each ʒij; calomel ʒj; beat into a mass with rectified spirit of wine. A powerful cathartic.

PILLS, RHUBARB. *Syn.* Pil. Rhæi. *Prep.* (P. E.) Powdered rhubarb 9 parts; acetate of potash 1 part; conserve of red roses 5 parts; mix, and divide into 5-gr. pills. Stomachic; purgative. *Dose.* 2 to 4 pills.

PILLS, RHUBARB, (COMPOUND.) *Syn.* Pil. Rhei comp., (P. L. and E.) *Prep.*—1. (P. L.) Powdered rhubarb ℥j; powdered aloes ʒvj; powdered myrrh ʒiv; Castile soap ʒj; oil of caraway fʒss; sirup q. s. to make a pill mass.—2. (P. E. 1839.) Rhubarb 12 parts; aloes 9 parts; myrrh and soap, of each 6 parts; confection of red roses 5 parts; oil of peppermint 1 part; mix, and divide into 5-gr. pills.—3. (P. E. 1817. *Edinburgh Pills.*) As the last, but beaten up with sirup of orange peel instead of conserve of roses. *** All the above are tonic, stomachic, and mildly purgative. *Dose.* 10 to 20 grs.

PILLS OF RHUBARB AND IRON. *Syn.* Pil. Rhæi et Ferri. *Prep.* (P. E.) Dried sulphate of iron 4 parts; extract of rhubarb 10 parts; conserve of roses 5 parts; divide into 5 gr. pills. Tonic; stomachic. *Dose.* 2 to 4 pills.

PILLS, RUDIUS'S. *Prep.* Colocynth pulp ʒvj; agaric, black hellebore, and turpethum root, of each ℥ss; cinnamon, mace, and cloves, of each ℈ij; rectified spirit ℥x; digest 4 days, express the tincture, and evaporate to a proper consistence. Formerly esteemed as one of the most certain cathartics, in troublesome constipation. *Dose.* 5 to 30 grs.

PILLS, SADILLOT'S FEBRIFUGE. *Prep.* Disulphate of quinine 12 grs.; powdered opium 3 grs.; confection of opium 10 grs., or q. s. for 12 pills. *Dose.* 1 pill every hour or two, in the intermission of an ague.

PILLS, SAGAPENUM, (COMPOUND.) *Syn.* Pil. Sagapeni comp. *Prep.* (P. L.) Sagapenum ℥j; aloes ʒss; sirup of ginger q. s. *Dose.* 5 to 20 grs., as a stimulant purgative in dyspepsia, with flatulence.

PILLS, SCOT'S. *Prep.* 1. Aloes 9 lbs.; jalap 3 lbs.; ginger ½ lb.; oil of aniseed 1 oz.; treacle 21 oz.; mix.—2. Aloes 1 lb.; colocynth 4 oz.; scammony and gamboge, of each ½ oz.; oil of aniseed 2 dr.; mix with sirup, and divide into 5 gr. pills. A good purgative pill.

PILLS, SCOT'S. (*Anderson's.*) *Prep.* 1. (*Pil. Andersonis*, P. Cod.) Aloes and gamboge, of each ʒvj; oil of aniseed ʒj; sirup to mix.—2. Barbadoes aloes 1 lb.; jalap 4 oz.; black hellebore 2 oz.; subcarbonate of potash 1 oz.; oil of aniseed ½ oz; sirup q. s. The last is a good purge, but the first is the most powerful.

PILLS, SPEEDIMAN'S. *Prep.* Aloes 1 lb.; myrrh, rhubarb, and extract of chamomile, of each 4 oz.; oil of chamomile ¼ oz.; mix. An excellent tonic and stomachic purge.

PILLS, SQUILL. *Syn.* Pil. Scillæ, (P. E.) Pil. Scillæ Comp. (P. L. & D.) *Prep.* (P. L.) Powdered squills ʒj; ginger and ammoniacum, of each ʒij; soap ʒiij; sirup q. s.; mix. An excellent expectorant and diuretic. *Dose.* 5 to 20 grs., in coughs, chronic bronchial affections, &c. It soon spoils.

PILLS, STARKEY'S. *Prep.* Extract of opium ℥iv; mineral bezoar and nutmeg, of each ℥ij; saffron and Virginian snake root, of each ℥j; Starkey's soap lb. ss; oil of sassafras ℥ss; tincture of antimony (old) f℥ij; mix. Anodyne. *Dose.* 3 to 10 grs.

PILLS, STOERCK'S. *Prep.* Extract of hemlock ʒj; powdered hemlock q. s. to make a pill mass; divide into 2-gr. pills. *Dose.* 1 to 4 twice a day, in various glandular and visceral enlargements, pulmonary affections, cancer, scrofula, neuralgia, &c.

PILLS, STORAX. *Syn.* Pil. Styracis, (P. E.) Pil. Styracis Comp., (P. L.) *Prep.* (P. L.) Strained storax ʒiij; powdered opium and saffron, of each ʒj; mix. Anodyne. *Dose.* 5 to 10 grs., in chronic coughs, &c.

PILLS, STRYCHNINE. *Syn.* Pil. Strychniæ. *Prep.* (Majendie.) Strychnia 2 grs.; conserve of roses ʒss; mix, divide into 24 pills and silver them.

PILLS, TANJORE. *Syn.* East India Pills. Carnatic Snake do. Asiatic do. Pil. Arsenici. *Prep.* (P. Cod.) White arsenic 1 gr.; black pepper 12 grs.; triturate well, add powdered gum 2 grs., and water q. s. to make a pill mass; divide into 15 pills. *Dose.* 1 or 2 after a meal. Commonly employed in the East Indies in syphilis, elephantiasis, the bite of poisonous snakes, and as a preventive of canine madness.

PILLS, TONIC. *Prep.* 1. (Thomson.)—*a.* Rhubarb and ginger, of each ʒss; extract of chamomile ʒj; divide into 30 pills. *Dose.* 2 or 3 twice a day in dyspepsia and chlorosis.—*b.* Sesquioxide of iron, and extract of hemlock, of each ʒj; divide into 20 pills. *Dose.* 1 or 2 twice a day in fluor albus and scrofula.—2. (Collier.) *a.* Tartrate of iron and extract of gentian, of each ʒj; oil of cinnamon 2 drops; for 30 pills. *Dose.* 3 to 6, 3 or 4 times a day. A good stomachic tonic.—*b.* Oxide of zinc ʒss, (or sulphate ℈j;) myrrh ʒij; camphor ℈j; confection of hips to mix; for 40 pills. *Dose.* 1 or 2 pills 3 times a day, in epilepsy, chorea, and other nervous disorders, debility, &c.—3. Sulphate of iron, ginger, and myrrh, equal parts; conserve of roses to mix. Divide into 4 gr. pills. *Dose.* 1 twice a day; in debility, &c.—4. Powdered myrrh and sulphate of iron, of each ʒj; sulphate of quinine ʒss; powdered capsicum 15 grs.; conserve to mix; divide into 60 pills. *Dose.* 1 or 2 twice or thrice a day in debility, dyspepsia, ague, &c.—5. (*Pil. Tonicæ Bacheri.* P. Cod.) Alkaline extract of hellebore, and extract of myrrh, of each ʒij; powdered holy thistle ʒj; mix and divide into 4-gr. pills.—6. (*Pil. Tonicæ Stahlii.*) Powdered iron filings, gum ammoniacum, and extract of lesser centaury, (chironia centaurium,) of each ʒj; sirup of fumitory q. s. to mix.

PILLS, VERATRIA. *Syn.* Pil. Veratriæ. *Prep.* (Turnbull.) Veratria 1 gr.; extract of henbane and liquorice powder, of each 12 grs.; mix, and divide into 12 pills. *Dose.* 1 every 3 hours; in dropsy, epilepsy, hysteria, paralysis, nervous palpitations, &c.

PILLS, WARD'S ANTIMONIAL. *Prep.* Glass of antimony, finely levigated, 4 oz.; dragon's blood 1 oz.; mountain wine q. s. to make a mass; divide into 1½-gr. pills. Emetic.

PILLS, WORM. *Syn.* Pil. Vermifugæ vel Anthelminticæ. *Prep.* 1. (Peschier.) Ethereal extract of malefern 30 drops; extract of dandelion ʒj; powdered gum q. s. for 30 pills. *Dose.* 6 to 20 or more, followed in half an hour by a strong dose of castor oil.—2. Calomel ℥j; sugar ℥iss, mucilage to mix; divide into 240 pills. *Dose.* 1 or 2 over night followed by a strong dose of castor oil early the next morning.—3. Gamboge 8 grs.; calomel 5 grs.; mucilage to mix. For a morning's dose.

PIMARIC ACID, obtained by Laurent from the turpentine of pinus maritima, by the action of hot alcohol. By distillation in vacuo it yields *pyromaric acid*, and under ordinary pressure *pimarone*. By the action of nitric acid it yields *azomaric* acid.

PIMENTIC ACID. Heavy oil of pimento.

PINIC ACID. The portion of common white resin soluble in cold alcohol of sp. gr. ·883.

PINK, BROWN. *Prep.* French berries and pearlash, of each 1 lb.; fustic chips ½ lb.; water 1½ gallons; boil in a tin or pewter vessel, and

strain through flannel while hot; then dissolve alum 1½ lbs., in hot water 2½ gallons, and add the solution to the strained decoction as long as a sediment falls; wash the latter, drain and dry. Some persons omit the fustic. *Used* as a yellow pigment. Is a fine glazing color when ground in linseed and used with drying oil.

PINK, DUTCH. *Prep.* French berries 1 lb.; turmeric ½ lb.; alum ½ lb.; water 1½ gallon; boil ½ an hour, strain, evaporate to 2 quarts, add whiting 3 lbs., and dry by a gentle heat. Starch or white lead is sometimes employed instead of whiting, to give it a body. Golden yellow. Used as a pigment.

PINK DYE. *Prep.* Washed safflowers 2 oz.; subcarbonate of potash 3 dr.; spirit of wine 7 oz.; digest 2 hours, add water 1 lb.; digest for 3 hours more, and add lemon juice q. s. to strike a rose color. *Used* as a cosmetic and to dye silk stockings.

PINK, ENGLISH. *Syn.* Light Pink. Prepared like Dutch pink, but with more whiting.

PINK, ROSE. Whiting colored with a decoction of Brazil wood and pearlash. A very pretty color, but does not stand. It is always kept in the damp state. The color may be varied by substituting alum for pearlash, or by the addition of a little spirits of tin.

PINK SAUCERS. *Prep.* Well washed safflower 8 oz.; carbonate of soda 2 oz.; water 2 gallons; infuse, strain, add French chalk, scraped fine with Dutch rushes, 4 lbs.; mix well, and precipitate the color on it by adding a solution of tartaric acid; collect the red powder, drain, add a very small quantity of gum, and apply the paste to the saucers. Less chalk may be used for a very fine article.

PIPERINE. *Syn.* Piperina. *Prep.* (P. Cod.) Treat alcoholic extract of black pepper with a solution of potash, (1 to 100;) wash the residue with water, dissolve in alcohol, filter, and let it evaporate spontaneously. White, tasteless, inodorous, fusible, and crystalline; reddened by oil of vitriol. It has been given in doses of 6 to 12 grs. in intermittent fevers.

PITCH, BURGUNDY. *Syn.* Pix Burgundica. Pix Abietina, (P. L.) "The true Burgundy pitch, so often prescribed for plasters, intended to produce a mild counter-irritation, is the resin of the *pinus abies*. It appears that the importation of this substance has for some years past been gradually lessening in amount, in consequence of the substitution for it of a factitious pitch, made by melting common resin together with linseed-oil, and coloring the mass with annotto. Mr. Cooley, in 'The Chemist,' July, 1844, says, this is well known among manufacturing druggists, the smallest difference of price inducing those gentlemen to substitute the spurious for the genuine article.—'The physiological action of the two articles is considerably different, since Burgundy pitch acts upon the skin as a powerful local irritant, exciting a slight degree of inflammation, and not unfrequently producing a pimply eruption, and an exudation of purulent matter from the cuticle on which it is applied. It is celebrated for its effects when employed as a plaster in all cases where warmth, support, and long adhesion to the skin are desirable, and in the latter quality no substance equals it. I have worn a pure Burgundy pitch-plaster on my chest from November until the following April, and it was still adhesive. The factitious Burgundy pitch has similar properties, but in an immensely less degree.' We cannot sufficiently express our abhorrence of such practices as the manufacture and sale of spurious drugs." (Lancet.)

The article above alluded to is made by melting good yellow resin 1 cwt., with linseed oil 1 gallon, and palm oil (bright) q. s. to color. The mass is next allowed to cool considerably, and then pulled with the hands in the same way as lead plaster is treated, after which it is placed in bladders or "stands" for use. The pulling or working destroys the translucency of the resin, and imparts the opacity of foreign Burgundy pitch. Water may be employed to cool it down. Annotto is often substituted for palm oil as a coloring. The addition of some of the droppings or bottoms of Canada balsam, Chio turpentine, oil of juniper, &c., will render this article equal to foreign pitch; but in commerce this is never attempted, the aim being only the production of a *lively* color with moderate toughness. A common melting-pan and fire (if clean and carefully managed) will succeed sufficiently; but, of course, both for safety and convenience, steam is preferable, and, on the large scale, almost indispensable. A good workman will pull and put into stands or casks about 5 cwt daily, or from 1 cwt. to 3 cwt. in bladders, the latter quantity depending on the size of the bladders; the small bladders occupying much longer, from the greater loss of time in tying, cutting, &c.

PITTACALL. (From πιττα, *pitch*, and καλος, *beautiful*.) A substance resembling indigo, obtained by Reichenbach from a certain portion of oil of tar, by the action of baryta. It gives a fast blue dye to cotton mordanted with tin and alum.

PLASTER. *Syn.* Emplastrum, (*Lat.*, from εμπλασσω, *to spread upon*.) Plasters are external applications that possess sufficient consistence not to adhere to the fingers when cold, but which become soft and adhesive at the temperature of the human body. They are chiefly composed of unctuous substances united to metallic oxides, or powders, or to wax, or resin. Plasters are usually formed while warm into ½ lb. rolls, about 8 or 9 inches long, and wrapped in paper. When wanted for use, a little is melted off the roll by means of a heated iron spatula, and spread upon leather, linen, or silk. The less adhesive plasters, when spread, are usually surrounded with a margin of resin plaster to make them adhere. In the preparation of plasters, the heat of a water-bath or steam should alone be employed. On the large scale, well cleaned and polished copper, or tinned copper pans, surrounded with iron jackets, supplied with high-pressure steam, are used for this purpose. The resins and gum resins that enter into their composition, should be previously purified by straining. After the ingredients are mixed and the mass has acquired sufficient consistence by cooling, portions of it are taken in the hands anointed with a little olive oil, and well pulled or worked till it becomes solid enough to form into rolls. To promote the cooling of the plaster it is usual to plunge it into cold water, and to expose it to the action of the fluid by working it about. after which it must be well pulled in the hands to

emove the water. Many plasters, as those of ead and resin, derive much of their whiteness and beauty from this treatment. White plasters are not, however, always the best, but they are those which are most admired and sought after.

PLASTER, AMMONIACUM. *Syn.* EMPLASTRUM AMMONIACI, (P. L. E. & D.) *Prep.* (P. L.) Ammoniacum (strained) ℥v; distilled vinegar ℥viij; dissolve and evaporate. The P. D. orders vinegar of squills ½ pint. Adhesive, stimulant, and resolvent. In scrofula, indolent swellings, &c.

PLASTER, AMMONIACUM AND MERCURY. *Syn.* EMP. AMMONIACI CUM HYDRARGYRO, (P. L. & D.) E. AMMON. ET HYDRARGYRI, P. E.) *Prep.* (P. L.) Olive oil ʒj; heat it in a mortar, add flowers of sulphur 8 grs.; triturate, add mercury ℥iij; again triturate till the globules are extinguished, then add it to ammoniacum (strained) lb. j, melted by a gentle heat, and mix well. As the last, but more powerful. *₊* This plaster cannot be rolled till considerably cooled, and must not be put into water.

II. (*Wholesale.*) Mercury 38 oz.; *prepared sevum* ½ lb.; triturate as last, and add the mixture to strained ammoniacum 10 lbs. Fine blue color and quickly made.

PLASTER, AROMATIC. *Syn.* STOMACH PLASTER. EMP. AROMATICUM. *Prep.* (P. D.) Strained frankincense (*thus*) ℥iij; beeswax ℥ss; melt, and when considerably cooled, add powdered cinnamon ʒvj; oils of allspice and lemons, of each ʒij. *₊* Must not be put into water. Stimulant; applied over the stomach in dyspepsia, pain, nausea, flatulence, &c. Some add camphor ʒj.

PLASTER, ASAFŒTIDA. *Syn.* EMP. ASAFŒTIDÆ. *Prep.* (P. E.) Lead plaster and strained asafœtida, of each, ℥ij; strained galbanum and beeswax, of each, ℥j; melt together. *₊* Must not be put into water. Antispasmodic. Applied to the stomach or abdomen in hysteria, or to the chest in hooping-cough.

PLASTER, BELLADONNA. *Syn.* EMP. BELLADONNÆ, (P. L. E. & D.) *Prep.* (P. L.) Extract of deadly nightshade ℥iss; resin plaster, melted by a gentle heat, ℥iij; mix. A powerful anodyne and antispasmodic; in neuralgia and rheumatic pains, and as an application to painful tumors. The plaster of the shops is usually deficient in extract. The following is a form I have been used in the wholesale trade:—Lead plaster and resin plaster, of each, 2½ lbs.; extract of belladonna 1¾ lbs. This plaster must not be pulled in water.

PLASTER, BURGUNDY PITCH. *Syn.* CEPHALIC PLASTER. EMP. CEPHALICUM, (P. L. 1745.) EMP. PICIS BURGUNDICÆ, (P. L. 1788.) EMP. PICIS COMP., (P. L. 1809, 1824.) EMP. PICIS, (P. L. 1836, & P. E.) *Prep.* (P. L.) Burgundy pitch lb. ij; resin of the spruce fir (thus) lb. j; yellow rosin and beeswax, of each, ℥iv; melt, add olive oil and water, of each, ℥ij; expressed oil of mace ℥j; and boil to a proper consistence. Stimulant and counter-irritant. Applied to the chest in pulmonary affections, to the joints in rheumatism, and to the loins in lumbago. It is a good warm plaster to wear on the chest during winter. *₊* The pitch plaster of the shops is made as follows: Factitious Burgundy pitch, bright colored, 42 lbs.; palm oil (bright) ¾ lb.; beeswax (bright) 5 lbs.; melt, and when nearly cold, add oil of mace 6 oz.; oil of nutmeg 1 oz.

PLASTER, CANTHARIDES. *Syn.* BLISTERING PLASTER. EMP. LYTTÆ, (P. L. 1809.) EMP. CANTHARIDIS, (P. L. E. & D.) *Prep.*—1. (P. L.) Wax plaster lb. iss; lard lb. ss; melt, and when considerably cooled, add finely powdered Spanish flies lb. j, and stir till stiff.—2. (P. E.) Cantharides, resin, beeswax, and suet, of each, ℥ij; mix as last. Used to raise blisters. It should be spread on leather with a cold knife, and surrounded with a margin of resin plaster. A piece of thin muslin or tissue paper is usually placed between the plaster and the skin to prevent absorption.—3. (*Wholesale.*) Flies and yellow rosin, of each, 6 lbs.; suet 10 lbs.; beeswax and lard, of each, 4 lbs. *₊* The above should be rolled in starch powder, and not with oil.

PLASTER, CANTHARIDES, (COMPOUND.) *Syn.* EMP. CANTHARIDIS COMP. *Prep.* (P. E.) Venice turpentine ℥ivss; Burgundy pitch and cantharides, of each, ℥iij; beeswax ʒj; verdigris ℥ss; black pepper and powder mustard, of each, ʒij; mix. Stronger than the last.

PLASTER, COURT. *Syn.* STICKING PLASTER. EMP. ADHESIVUM ANGLICUM, (Ph. Bor.) *Prep.* 1. (Paris.) Black silk or sarsenet is strained and brushed over 10 or 12 times with the following composition:—Balsam (gum) of benzoin ½ oz.; rectified spirit 6 oz.; dissolve. In a separate vessel dissolve 1 oz. of isinglass in as little water as possible; strain each solution, mix, and decant the clear. It is applied warm. When the last coat is quite dry, a finishing coat must be given with a solution of 4 oz. of Chio turpentine in 6 oz. of tincture of benzoin.—2. Isinglass 1 oz.; dissolve in proof spirit 12 oz.; add tincture of benzoin 2 oz.; give 5 or 6 coats, and finish off as last.—3. Isinglass 1 oz.; water 3 oz.; dissolve, add tincture of benzoin 1 oz.; apply as above, and finish off with a coat of tincture of benzoin or tincture of balsam of Peru. *₊* Goldbeaters' skin is now frequently substituted for sarsenet.

PLASTER, CUMIN. *Syn.* EMP. CYMINI. E. CUMINI. *Prep.* (P. L. 1824.) Burgundy pitch lb. iij; beeswax ℥iij; melt, and add cumin seeds, caraway do., and laurel berries, (all in fine powder,) of each ℥iij; water and olive oil, of each f℥iss.—2. Yellow rosin 7 lbs.; beeswax and linseed oil, of each, ½ lb.; powdered cumin and caraway seeds, of each, 7 oz.; mix. Discutient; applied to the stomach and belly in dyspepsia and flatulence, and also to indolent tumors.

PLASTER, GALBANUM. *Syn.* YELLOW DIACHYLON. GUM DO. EMP. GALBANI COMP., (P. L. 1824.) EMP. GALBANI, (P. L. 1836 & P. D.) E. GUMMOSUM, (P. E.) *Prep.*—1. (P. L.) Lead plaster lb. iij; resin of spruce fir ℥iij; melt, add common turpentine (Venice) ʒx; strained galbanum ℥viij.—2. (*Wholesale.*) Lead plaster 42 lbs.; yellow rosin 12 lbs.; strained galbanum 2 lbs.; strained asafœtida 1 oz. Stimulant and resolvent.

PLASTERS, ISSUE. *Syn.* SPARADRAPUM PRO FONTICULIS. *Prep.* Beeswax lb. ss; Burgundy pitch and Chio turpentine, of each ℥iv; vermilion and orris powder, of each ℥j; musk 4 grs.; melt, spread upon linen, polish with a smooth

piece of glass moistened with water, and cut into pieces.

PLASTER, KENNEDY'S CORN. *Prep.* Wax lb. j; Venice turpentine ℥iv; verdigris ℥iss; spread on cloth, cut, polish, and put 12 bits into each box.

PLASTER, LEAD. *Syn.* DIACHYLON. WHITE DO. SIMPLE DO. DIAPALME. DIACHYLON SIMPLEX, (P. L. 1720.) EMP. COMMUNE, (P. L. 1745.) E. LYTHARGYRI, (P. L. 1788, P. E. & D.) EMP. PLUMBI, (P. L. 1809, and since.) *Prep.* I. (P. L.) Finely-powdered litharge lb. vj; olive oil 1 gallon; water 1 quart; boil to the consistence of a plaster, adding more water if required.

II. (P. E.) Litharge ℥v; olive oil f℥xij; water f℥iij. As last.

III. (Otto Kohnke.) For each pound of litharge employed, add ¼ pint of colorless vinegar, (each ounce of which is capable of saturating ʒss of carbonate of potash;) boil until all moisture is evaporated, and until only a few striæ of litharge rise to the surface, then remove the heat, add gradually ⅓ to ½ as much vinegar as before, and boil to a proper consistence.

IV. (*Wholesale.*)—*a.* Genoa oil 60 lbs.; litharge 30 lbs.; water 2 or 3 gallons.—*b.* Oil 70 lbs.; litharge 30 lbs.; water 2 or 3 gallons.

Remarks. The London College orders too little oil. The second, fourth, and fifth forms produce beautiful plasters, and so does the third, provided enough oil be used. The proper proportion of litharge is 1 lb. to every 2½ lbs. of oil, (C. Watt,) and without this is used, the plaster speedily gets hard and brittle, and loses its adhesiveness. The process consists in putting the water and litharge into a clean and polished tinned-copper or copper pan, mixing them well together with a spatula, adding the oil, and boiling with constant stirring till the plaster is brittle, when *thoroughly* cold. This process usually occupies from 4 to 5 hours, but by adopting the third formula, an excellent plaster may be made in 15 or 20 minutes. To render this plaster *very white*, it is usual to submit it to laborious pulling.

Use. As a simple strapping, but principally as a basis for other plasters.

PLASTER, MELILOT. *Syn.* EMP. MELILOTI. *Prep.* (P. E. 1744.) Fresh melilot, chopped small, lb. vj; suet lb. iij; boil till crisp, strain with pressure, and add yellow rosin lb. viij; beeswax lb. iv. Stimulant. Used to dress blisters, &c. The greater portion of this plaster in the shops is colored with verdigris, and is frequently made without the herb. I have seen the following form used in the wholesale trade:—Yellow rosin 18 lbs.; green ointment 4½ lbs.; yellow wax 3 lbs.; finely-powdered verdigris to give a deep-green color.

PLASTER, MERCURIAL. *Syn.* EMP. HYDRARGYRI, (P. L. & E.) *Prep.* (P. L.) Lead plaster lb. j; melt; add mercury ℥iij, previously "killed" by trituration with balsam of sulphur fʒj.—2. (*Wholesale.*) Mercury 7 lbs.; prepared sevum ½ lb.; triturate till the globules disappear, and add it to lead plaster, melted by a gentle heat 36 lbs.; stir well together. Very fine blue or lead color. *Used* as a discutient in glandular enlargements, and other swellings; and also applied over the hepatic regions in liver complaints.

PLASTER, OPIUM. *Syn.* EMP. OPII, (P. L. E. & D.) *Prep.* I. (P. L.) Lead plaster lb. j; melt, add powdered thus ℥iij; mix, and further add powdered opium ℥ss; water f℥viij, and boil to a proper consistence. The other Colleges omit the water, and use Burgundy pitch for thus. *Used* as an anodyne.

II. (*Wholesale.*) Lead plaster 10 lbs.; yellow resin 30 oz.; powdered opium 4 oz.

PLASTER, OXIDE OF IRON. *Syn.* IRON PLASTER. FRANKINCENSE DO. STRENGTHENING DO. EMP. ROBORANS. E. FERRI OXYDI. E. FERRI, (P. E.) E. THURIS, (P. D.) *Prep.* I. (P. E.) Lead plaster ℥iij; yellow resin ʒvj; beeswax ʒiij; melt together, then add red oxide of iron ℥j, previously triturated with olive oil fʒiiss.

II. (P. L. 1788.) Thus lb. ss; dragon's blood ℥iij; lead plaster lb. ij.

III. (*Wholesale.*) Lead plaster (dry) 72 lbs.; powdered yellow resin 12 lbs.; crocus martis (lively colored) 14 lbs.; olive oil 1 quart. Iron plaster is strengthening and stimulant, and employed as a mechanical support in muscular relaxation, weakness of the joints, &c., especially by public dancers.

PLASTER, OXYCROCEUM. *Syn.* EMP. OXYCROCEUM. *Prep.*—1. (P. E. 1744.) Beeswax lb. j; black pitch and strained galbanum, of each lb. ss; melt, and add Venice turpentine, powdered myrrh, and olibanum, of each ℥iij; powdered saffron ℥ij.—2. (*Wholesale.*) Black pitch 9 lbs.; black rosin 10½ lbs.; beeswax and lard, of each 2¼ lbs.; melt together. Warm; discutient.

PLASTER, PARACELSUS. *Syn.* EMP. STYPTICUM. *Prep.* Lead plaster 28 lbs.; galbanum plaster 2 lbs.; powdered white canella, and gum thus, of each 1½ lb.; melt together.

PLASTER, RED LEAD. *Syn.* EMP. E MINIO. Made as lead plaster, but with red lead instead of litharge. If boiled to perfect dryness it forms the *Emp. è minio fuscum.* Lead plaster, colored with red lead, is usually sold for it.

PLASTER, RESIN. *Syn.* ADHESIVE PLASTER. BAYNTON'S DO. EMP. RESINÆ, (P. L.) E. RESINOSUM, (P. E.) E. LYTHARGYRI CUM RESINA, (P. D.) E. ADHESIVUM. *Prep.*—1. (P. L.) Lead plaster (dry) lb. iij; melt, and add yellow resin (powdered) lb. ss. Principally used as a *strapping* for dressing ulcers, retaining the lips of cuts and wounds in contact, &c.—2. (*Wholesale.*) Lead plaster (dry) 60 lbs.; pale yellow resin (powdered) 10 lbs.

PLASTER, SOAP. *Syn.* EMP. SAPONIS, (P. L. E. & D.) *Prep.* (P. L.) Litharge plaster lb. iij; soap (white) sliced lb. ss; melt together, and boil to a proper consistence. If it contains water it will crumble. Discutient; in abrasions, &c.

PLASTER, SOAP, (COMPOUND.) *Syn.* EMP. SAPONIS COMP. vel ADHÆRENS. *Prep.* (P. D.) Soap plaster ℥ij; resin plaster ℥iij; melt together. *Used* in abrasions, &c. ⁂ Neither of the above must be put into water.

PLASTER, VERDIGRIS. *Syn.* CORN PLASTER. EMP. ÆRUGINIS. *Prep.* (P. Cod.) Wax 4 oz.; Burgundy pitch 2 oz.; melt, add Venice turpentine and powdered verdigris, of each 1 oz.

PLASTER, WARMING. *Syn.* EMP. CALE-

FACIENS. *Prep.* (P. D.) Burgundy pitch 7 parts; melt, and add plaster of cantharides 1 part. Some add a little camphor. Stimulant and rubefacient. *Used* in chest complaints, local pains, &c.

PLASTER, WAX. *Syn.* SIMPLE PLASTER. EMP. ATTRAHENS. E. SIMPLEX, (P. E.) E. CERÆ, (P. L.) *Prep.* (P. L.) Yellow wax and suet, of each lb. iij; yellow resin lb. j; melt and strain. A simple dressing.

PLATINIZING. *Proc.* I. (*In the moist way.*) Solid chloride of platinum 1 part, is dissolved in water 100 parts, and to this solution is added common salt 8 parts; or still better, 1 part of platino-chloride of ammonia and 8 parts of hydrochlorate of ammonia are placed in a flat porcelain vessel, 32 to 40 parts of water poured over it, the whole heated to boiling, and the vessels of copper or brass, perfectly bright, are placed therein. They will be covered in a few seconds with a brilliant and firmly-adhering layer of platina.

II. (*By the Electrotype.*)—*a.* Proceed as directed under VOLTAIC GILDING, but make use of a dilute solution of the double chloride of soda and platinum. Three immersions suffice; between each immersion it is necessary to dry the surface with fine linen, rubbing rather briskly, after which it must be thoroughly cleaned with levigated chalk. When copper has been gilded in the moist way, the gilt surface has not always a beautiful tint; but if the copper be previously covered with a pellicle of platina, a very beautiful golden surface may be produced. (M. Boettger.)

b. (M. Ruolz.) As the third process of voltaic gilding, (p. 335,) but using double chloride of platinum and potassium, dissolved in caustic potassa. This solution allows of platinizing with the same facility and promptitude as in gilding or silvering. *** Manufacturing and operative chemists will find, in this process, a means of procuring large capsules of platinized brass, which combine cheapness with the necessary resistance to saline or acid solutions. 1 millegramme of platinum is capable of perfectly covering 50 square millimètres, which corresponds to a thickness of 1-100,000th of a millimètre. Platinum, thus applied, may be obtained from the crude solution of platinum ore, as the metals which accompany it do not injure the effect. (Dumas.)

PLATINUM. *Syn.* PLATINA, (from *plata*, Span. *silver.*) A heavy, white-colored metal, chiefly imported from South America, where it is found in a granular form, associated with some other rare metals. It has the sp. gr. 21·25 to 21·5 after forging, being the heaviest metal known, and is remarkable for its hardness, and power of resisting heat, and acid menstrua. Crude platinum is purified by solution in nitromuriatic acid, somewhat dilute, precipitation by muriate of ammonia, and exposing the precipitate to a violent heat. The metal reduced in an agglutinated state, may be rendered more compact by pressure while red hot. Platinum undergoes no change by exposure to air and moisture, or the strongest heat of a smith's forge, and is not attacked by any of the pure acids, but is dissolved by chlorine and nitromuriatic acid, though with more difficulty than gold. Spongy and powdered platinum possesses the remarkable property of causing the union of oxygen and hydrogen gases. Platinum is precipitated from its solutions by deoxidizing substances under the form of a black powder, which has the power of absorbing oxygen, and again imparting it to combustible substances, and thus causing their oxidation. In this way alcohol and pyroxilic spirit may be converted into the acetic and formic acids, &c. (See ACETIC ACID.)—OXIDE or PROTOXIDE OF PLATINUM is obtained by digesting protochloride of platinum in a solution of pure potassa in very slight excess. It dissolves slowly in the acids, forming *salts of platinum.*—The BINOXIDE, DEUTOXIDE, or PEROXIDE, by exactly decomposing the sulphate of the binoxide with nitrate of baryta, and adding pure soda to the filtered solution, so as to precipitate only half the oxide. (Berzelius.)—The SESQUIOXIDE, by heating fulminating platinum in nitrous acid. (E. Davy.)—The PROTOCHLORIDE, by heating the bichloride to about 450°; greenish gray.—The BICHLORIDE, by evaporating the nitromuriatic solution to dryness, at a gentle heat; red.—The PROTIODIDE, by digesting the protochloride in a solution of iodide of potassium; black. (Lassaigne.)—The PERIODIDE, by the action of iodide of potassium on a weak solution of the bichloride; black. (Lassaigne.)—The PROTOSULPHURET, by heating the yellow ammoniacal chloride with ½ its weight of sulphur in a retort.—The BISULPHURET, by dropping a solution of the bichloride into a solution of sulphuret of potassium.—FULMINATING PLATINUM, by acting on sulphate of platinum with ammonia in slight excess.—The PLATINO-BICHLORIDE OF POTASSIUM, by mixing solutions of bichloride of platinum and chloride of potassium, and evaporating; a yellow powder, or small octohedrons.—The PLATINO-BICHLORIDE OF SODIUM, as the last.—The PLATINO-BICHLORIDE OF AMMONIA, by precipitating a strong solution of the bichloride by a solution of sal ammoniac; an insoluble yellow powder.—The PLATINO-PROTOCHLORIDES are prepared in a similar way.—PLATINA-MOHR is obtained by melting platina ore with twice its weight of zinc, powdering, digesting first in dilute sulphuric acid, and next in dilute nitric acid, to remove the zinc, assisting the action of the menstruum by heat; it is then digested in potash lye, and lastly in pure water. (Descotils.) An insoluble grayish black powder, consisting of crude platinum. It acts like platinum black, converting alcohol into vinegar, &c. It explodes by heat. *** The salts of platinum are said to be alterative. The bichloride and the sodio-chloride have been employed both internally and endermically in syphilis, &c. They are *poisonous.*

PLUMBAGINE. A crystalline substance, extracted by M. Dulong from the roots of plumbago europea. It is soluble in alcohol, ether, and water.

POISON. When you have reason to suppose that you have accidentally swallowed a poisonous substance, and proper medical advice is not at hand, take an emetic. This may be done almost instantaneously, by swallowing a cupful of warm water mixed with a teaspoonful of mustard. If you have not dry mustard in the house, you are almost sure to have a mustard-pot, and a quantity from that put into the water will very quickly

empty the stomach. As mustard may thus prove of so much use, it should never be wanting in any house; but even should there be no mustard at hand, warm water by itself forms a tolerably efficacious emetic. (See the various POISONS for their antidotes.)

POLYCHROME. A peculiar substance obtained from the bark of the horse-chesnut, and from quassia wood, by precipitating the infusion by acetate of lead, decomposing the precipitate by sulphureted hydrogen, filtering, and evaporating to a sirup, when crystals of polychrome form after some time. It is purified by repeated solutions in a mixture of alcohol and ether. The solution appears colorless by transmitted light, but blue by reflected light, and exhibits a beautiful play of colors, visible when dissolved in 1,500,000 parts of water.

POLYCHROMIC ACID. *Syn.* ARTIFICIAL BITTER OF ALOES. *Prep.* Aloes 1 part; nitric acid (sp. gr. 1·25) 8 parts; mix, and when the action is over, evaporate to a sirup, and add cold water to throw down the polychromic acid; purify by washing with water till the liquid passes off of a blue color. A yellowish brown powder forming a purple solution; it explodes when heated. It is a mixture of *Aloetic* and *Aloeresinic Acids.* (Schunck.)

POMMADE, (Fr. *Pomatum.*) Pommades are divided by the French perfumers into three classes; viz.—*Pommades by infusion*—*Pommades by contact, and*—*Pommades by addition.* The *first* are made by gently melting in a clean pan, 2 parts of hog's lard and 1 part of beef suet, both of the finest quality and carefully "rendered;" and adding 1 part of flowers, carefully picked, or if a solid substance, coarsely bruised, and macerating for 24 hours, occasionally stirring, and observing to keep the vessel covered as much as possible. The next day the mixture is remelted, and again well stirred for a short time, after which it is poured into canvass bags, and these being next securely tied, are submitted to powerful pressure, gradually increased, in a barrel press. This operation is repeated with the same fat several times, until the pommade is sufficiently perfumed. A good *pommade aux fleurs,* requires twice to six times its weight of flowers to be thus consumed, and pommades of the aromatic barks and seeds a corresponding proportion. *** In the same way are made the *pommades of Cassia, orange flowers,* and several others kept by the French perfumers.

Pommades by contact are made by spreading with a palette knife simple pommade (made with lard and suet as above) on panes of glass or pewter plates, to the thickness of a finger, and sticking the surface all over with sweet-scented flowers, which must be renewed daily for 2 or 3 months, or till the pommade has acquired sufficient perfume. On the large scale, the panes are placed in small shallow frames made of 4 pieces of wood nicely fitted together, and are then closely piled one upon another. On the small scale pewter plates are mostly used, and one is inverted over the other. In some of the perfumeries of France, many thousands of frames are employed at once. *** In this way are made the *Pommades Jasmin, Jonquil, Orange-flowers, Narcissus, Tuberose, Violet,* &c.

Pommades by addition are made by merely adding the fragrant essences or oils in sufficient quantity to the simple pommade of lard and suet to produce the proper odor; or by mixing together other pommades. *** In this way are made the *Pommades of Bergamotte, Cédrat, Cinnamon, Lemons, Lemon thyme, Lavender, Limettes, Marjoram, Portugal, White Rose, Rosemary, Thyme, Verbena,* and about 30 others, distinguished by the Parisian perfumers.

Mixed Pommades. Of these a great number are prepared by the French, by the judicious combination of the most esteemed perfumes or Pommades, of which the following are a few examples:—

POMMADE A LA VANILLE, or *Roman pommade.* Pommade à la rose 12 lbs.; powdered vanilla 1 lb.; melt in a water bath, stir constantly for 1 hour, let it settle for another hour, decant the clear, and add oil à la rose $2\frac{1}{2}$ lbs.; bergamotte 4 oz.—POMMADE DE CASSE. Simple pommade 1 lb.; palm oil $\frac{1}{2}$ oz.; melt, pour off the clear, and add oil of cassia and huile au jasmin, of each 1 dr.; neroli, 20 drops; oil of verbena, or lemon grass, 15 drops; otto of roses, 5 drops; stir till nearly cold.—POMMADE DIVINE. Plain pommade, 1 lb.; essences of lemon and bergamotte, of each 2 dr.; oils of lavender and origanum, of each 1 dr.; oils of verbena, cassia, cloves, and neroli, of each 12 drops; huile au jasmin, 3 dr.; essence of violets, $\frac{1}{2}$ oz. *** Pommades are colored—*Yellow,* by palm oil or annotto—*Red,* by alkanet root—and *Green,* by guaiacum, or the green leaves of spinage or parsley. *White* pommades are made with mutton instead of beef suet.

POMATUM. (From *pomum,* an apple.) A fragrant unguent used in dressing the hair; so named because it was formerly made with lard and apples. (See POMMADES.)—SIMPLE POMATUM. 1. Lard 2 lbs.; beef suet 1 lb.—2. Lard 3 lbs.; mutton suet $1\frac{1}{4}$ lb.—COMMON POMATUM. Simple pomatum 1 lb.; essence of lemon 1 dr.—EAST INDIA POMATUM. Suet 3 lbs.; lard 2 lbs.; beeswax (bright) $\frac{1}{2}$ lb.; palm oil [illegible]oz.; powdered gum benzoin 3 oz.; musk 20 grs.; melt, and digest two hours, decant, add essence of lemon 1 oz.; oil of lavender $\frac{1}{4}$ oz.; oils of cloves, cassia, and verbena, of each 1 dr.—ROSE POMATUM. Lard or simple pomatum washed with rose water, or scented with otto. It may be reddened with alkanet.—SOFT POMATUM. Hard lard, scented like East India pomatum.—MILLEFLEUR POMATUM. Simple pomatum, scented so that no one perfume shall predominate.—ROLL POMATUM. (*Hard do.*) Mutton suet 6 lbs.; white wax $\frac{3}{4}$ lb.; spermaceti $\frac{1}{4}$ lb.; powdered benzoin 1 oz.; melt, and add scent at pleasure.—MARESCHAL POMATUM. (*Hard.*) To the last add mareschal powder 6 to 8 oz.

PORPHYROXINE. A neutral crystalline substance, discovered by Merck in Bengal opium. It is soluble in alcohol and ether.

PORTER. A fermented liquor, brewed from pale malt, mixed with a sufficient portion of high-dried malt to impart the necessary color and flavor. In many cases, its color is imparted by parched malt or burnt sugar, subsequently to the boiling. (See BREWING.) Porter originated with a London brewer named Harwood, in 1722, and was first called "*entire,*" or "*entire butt,*" from being drawn from one cask. Previously to that date, *ale, beer,* and *two-penny* were the common

beverages, either alone or mixed, under the names of *half-and-half*, or "*three threads*," for which the publican was compelled to have recourse to 2 or 3 casks. The term porter was given from its general consumption among porters and laborers. Ordinary porter contains 4 to 5§ of alcohol.

Prep. I. (*Draught.*) *a.* Pale malt 3½ quarters; amber malt 3 quarters; brown malt 1½ quarters; mash at twice with 28 and 24 barrels of water, boil with brown Kent hops 56 lbs.; set with yeast 40 lbs. *Prod.* 28 barrels, or 3½ times the malt, besides 20 barrels of table-beer from a third mashing.

II. (*Bottling Porter. Brown Stout.*) Pale malt 2 quarters; amber and brown malt, of each 1½ do.; mash at 3 times with 12, 7, and 6 barrels of water, boil with hops 50 lbs.; set with yeast 26 lbs. *Prod.* 17 barrels, or 1½ times the malt.

III. For either of the above use pale malt mixed with one-seventy-ninth part of patent malt for porter, and one-seventieth part for brown stout.

IV. (*Brown Stout.*) To a butt of good porter add 4 gallons of treacle, 1 gallon of coloring, and 1 quart of finings; rummage up well, and in a week rack it into another cask.

POSOLOGICAL TABLE for proportioning the doses of medicines to the age of the patient, originally drawn up by Gaubius.

Under	½ year	1-16th of a full dose.	
"	1 "	1-12th	"
"	2 yrs.	1-8th	"
"	3 "	1-6th	"
"	4 "	1-5th	"
"	7 "	1-3d	"
"	14 "	1-half	"
"	20 "	2-3ds	"
Above	21 "	the full dose.	
"	63 "	11-12ths	"
"	77 "	5-6ths	"
"	100 "	2-3ds	"

Dr. Young gives the following simple formula:—For children under 12 years, the doses of most medicines must be diminished in the proportion of the age to the age increased by 12. Thus, at 2 years, the dose will be 1-7th of that for an adult, viz: $\frac{2}{2+12}$ = 1-7th.

*** Sex, temperament, constitutional strength, and the habits and idiosyncrasies of individuals, must be taken into account. Nor does the same rule apply to all medicines. *Calomel*, for instance, is generally borne better by children than by adults; while *opium* affects them more powerfully, and requires the dose to be diminished considerably below that indicated above.

POTASH. *Syn.* Oxide or Protoxide of Potassium. Potassa, (*Lat.*) Potasse, (*Fr.*) Kali, (*Ger.*) The potash of commerce is a carbonate of potassa, or oxide of potassium, and has been already noticed at page 221. Pure anhydrous potassa is a white solid substance, highly caustic and corrosive, fusible, and possessing a powerful affinity for water, intense heat being evolved during its combination with that fluid. The hydrate of potassa is the *potassa fusa* of the shops. Both these substances exhibit alkaline and basic properties in the most marked degree, turning vegetable yellows *brown*, and blues *green*, and forming salts with the acids. Most of the salts of potassa may be made by directly saturating a solution of the acid with a solution of the carbonate or hydrate of potassa, and, in some instances advantageously, by double decomposition. In either case, the filtered solution will generally yield crystals on evaporation. (See Potassa, hydrate of.)

Tests, &c.—1. The solutions of potassa or its salts are unaffected by sulphureted hydrogen, hydrosulphurets, prussiates, and carbonates.—2. Tartaric acid (in excess) and perchloric acid give respectively white precipitates of bitartrate and perchlorate of potassa.—3. Carbazotic acid throws down a yellow crystalline precipitate, which is sparingly soluble.—4. Chloride of platinum gives a pale yellow precipitate.—5. Free potassa *reddens* turmeric, and turns *reddened* litmus *blue*.

POTASSA, ACETATE OF. *Syn.* Diuretic Salt. Foliated Salt of Tartar. Sal diureticus, (P. L. 1745.) Kali acetatum, (P. L. 1788.) Potassæ acetas, (P. L. 1809, and since, and P. E. & D.) *Prep.* (P. L.) Acetic acid f℥xxvj; water f℥xij; mix, and add gradually carbonate of potash lb. j, or q. s. to saturate; filter, and evaporate in a sand-bath to dryness.

POTASSA, BISULPHATE OF. *Syn.* Supersulphate of Potash. Acid Vitriolated Tartar. Sal auri philosophicum. Sal enixum. Potassæ bisulphas, (P. L. E. & D.) *Prep.* I. (P. L.) Salt left in distilling nitric acid lb. ij; boiling water 3 quarts; dissolve, add sulphuric acid lb. j, evaporate, and crystallize.

II. (P. D.) Sulphuric acid 1 part; water 6 parts; mix, and saturate with carbonate of potash q. s., then add 1 part more of sulphuric acid, and proceed as last.

POTASSA, BITARTRATE OF. *Syn.* Cream of Tartar. Supertartrate of Potash. Acidulous Tartrate of Potash. Potassæ bitartras, (P. L. E. & D.) This salt is obtained during the fermentation of grape juice, as a crust on the sides of the casks or vats. In its unprepared state it is called *white* or *red crude tartar*, or *argol*, according to the wine from which it has been obtained. It is purified by boiling in water, crystallization, re-solution in water, and treatment with charcoal and aluminous clay to remove the color; the clear liquid is then decanted while hot, and allowed to cool slowly; the resulting crystals are *cream of tartar*. *** "Entirely soluble in 40 parts of water; 40 grs. in solution are neutralized with 30 grs. of crystallized carbonate of soda." (P. E.) "It reddens litmus. At a red heat, it is converted into carbonate of potash." (P. L.) *Dose.* 1 to 2 drachms or more, as an aperient; as a diuretic, 20 grs. to a drachm. It is used to make a pleasant cooling drink, (*imperial*,) and in tooth powders.

POTASH, CITRATE OF. *Syn.* Lemonated Kali. The preparation sold in the shops under this name is made as follows:—Finely-powdered white sugar 16 lbs.; tartaric acid 4½ lbs.; sesquicarbonate of soda 4 lbs.; all thoroughly dried by a gentle heat; mix, add essence of lemon 1 oz.; rub the powder through a sieve in a dry situation, put it into bottles, and cork down immediately. Keeps well. A dessert-spoonful thrown into a glass of water makes a pleasant effervescing cooling beverage.

POTASSA, HYDRATE OF. *Syn.* Pure

POTASSA. CAUSTIC DO. CAUTERIUM POTENTIALE. KALI CAUSTICUM. LAPIS INFERNALIS vel SEPTICUM, (P. L. 1720.) KALI PURUM, (P. L. 1788.) POTASSA FUSA, (P. L. 1809, 1824.) POTASSÆ HYDRAS, (P. L. 1836.) POTASSA, (P. E.) POTASSA CAUSTICA, (P. D.) *Prep.* (P. L.) Liquor of potassa 1 gallon; evaporate in a clean iron vessel over the fire until the ebullition being finished, the hydrate of potassa liquefies; pour this into proper moulds.

⁂ A pale grayish or bluish solid, very soluble in water and alcohol. "Boiling water commonly leaves oxide of iron undissolved, which should not exceed 1·25§." (P. E.) "It should be totally soluble in alcohol." (P. L.) Its solution should be scarcely affected by the nitrates of baryta and silver. It is chiefly used as a caustic, and in chemistry.

POTASSE D'AMERIQUE. *Syn.* PETIT POTASSE BLEU. Caustic soda, melted with salt and lime, and tinged with oxide of copper. This is said to be commonly sold to the Parisian laundresses for American potash, as they object to using soda. The potash of the shops in England is often mixed with a similar compound.

POTASSIUM. The metallic base of potash. It was discovered by Sir H. Davy in 1807, who obtained it by the action of a powerful galvanic battery on moistened hydrate of potassa. It has since been procured by easier methods.

Prep. I. (Curaudau.) Perfectly dry carbonate of potassa 2 parts; powdered charcoal 1 part; mix, place them in a gun-barrel or iron bottle, furnished with a short iron tube, and connected with a copper receiver containing a little naphtha and surrounded with ice, and distil by a strong heat.

II. (Brunner.) Fused carbonate of potassa or calcined tartar 1 lb.; iron filings ⅞ lb.; charcoal ⅛ lb.; proceed as above. *Prod.* 280 grs. It may be further purified by distillation in an iron or green glass retort.

Props., &c. Potassium is solid at ordinary temperatures, but softens at 70°, and fuses at 150°. It sublimes at a low red heat; color and lustre resembles mercury. Sp. gr. 0·865. Its most remarkable property is its affinity for oxygen gas, which is so great that it takes it from most substances containing it, and can only be preserved in naphtha, or other fluid hydrocarbons. It is decomposed with the evolution of light and heat by contact with water, and a solution of pure potassa results. It unites with oxygen forming oxides, one of which is potassa, and the other (*peroxide*) an orange-colored substance formed by burning potassium in air or oxygen gas, or by passing oxygen over potassa heated to redness.

POTASSIUM, BROMIDE OF. *Syn.* HYDROBROMATE OF POTASSA. POTASSII BROMIDUM, (P. L.) POTASSÆ HYDROBROMAS. *Prep.* (P. L.) Water 1½ pints; iron filings ℥j; mix, add bromine ℥ij; stir, and in half an hour apply a gentle heat till the liquor turns green, then add carbonate of potash ℥xvij, dissolved in water 1½ pints; strain, wash the precipitate with hot water, filter the mixed liquors, evaporate, and crystallize. White transparent cubic or rectangular prisms; inodorous, and soluble in water. It should be neutral to test paper. *Dose.* 4 to 10 grs. in pills or solution, 2 or 3 times daily; in scrofula, bronchocele, &c. It is also made into ointment.

POTASSIUM, IODIDE OF. *Syn.* HYDRIODATE OF POTASH. POTASSII IODIDUM, (P. L. and E.) POTASSÆ HYDRIODAS, (P. D.) *Prep.* I. (P. L.) Iron filings ℥ij; water 2 quarts; iodine ℥vj; mix, heat till the solution turns green, then add carbonate of potash ℥iv, dissolved in water 1 quart; filter, wash the residue with water, evaporate the filtered mixed liquors, and crystallize. The Edinburgh form is similar. *Prod.* 4 oz. of iodine yield 4 oz. 3 dr.

II. (P. D.) By saturating with carbonate of potash an aqueous solution of hydriodic acid, formed by transmitting chlorine through water in which iodine is suspended. *Prod.* 4 oz. of iodine yield 4 oz. 7 dr. 20 grs.

III. (Turner.) Add to a hot solution of caustic potassa, sp. gr. 1·19, as much iodine as it will dissolve, then pass sulphureted hydrogen through the liquid until it becomes colorless, apply a gentle heat to expel excess of acid, filter, exactly neutralize with potassa, evaporate, and crystallize. *Prod.* 4 oz. of iodine yield 4 oz. 4 dr. 24 grs.

IV. (Gregory.) Add iodine to a hot solution of pure potassa until the alkali is neutralized, evaporate to dryness, and expose the dry mass to a gentle red heat in a platinum or iron crucible, then dissolve out the salt, evaporate, and crystallize. An excellent process.

V. (Scanlan.) As the last, but mix a portion of powdered charcoal with the mass before ignition. An excellent process.

VI. (Duflos.) Iodine and granulated zinc, of each 4 oz.; water 8 oz.; after the action has ceased, neutralize with a solution of carbonate of potash in slight excess, filter, neutralize with a little hydriodic acid, treat it with sulphureted hydrogen for the sake of security, evaporate, and crystallize. *Prod.* 4 oz. of iodine yield 5 oz. 17 gr.

Remarks. According to theory 4 oz. of iodine should yield 5 oz. 1 dr. 55 grs. of pure iodide of potassium; but such a product is never obtained in practice, as will be seen by reference to the above formulæ, which are those most generally approved of for the preparation of a pure salt. The old method of acting on iodine with potash, or carbonate of potash water, yields a very impure product.

⁂ Pure iodide of potassium in powder is "totally soluble in water and in alcohol. It alters the color of turmeric either not at all, or but very slightly. It does not discolor litmus. Subjected to heat, it loses no weight. Sulphuric acid and starch added together, turn it blue. 10 grs. of this salt should decompose 10·24 grs. of (pure) nitrate of silver; the precipitate is partly dissolved by nitric acid, and partly altered in appearance, which is not the case when ammonia is added." (P. L.) "Its solution is not affected, or only rendered hazy by solution of nitrate of baryta. A solution of 5 grs. in f℥j of distilled water, precipitated by an excess of solution of nitrate of silver, and then agitated in a bottle with a little water of ammonia, yields quickly, by subsidence, a clear supernatant liquor, which is not altered by an excess of nitric acid, or is merely rendered hazy." (P. E.) *Dose* 2 to 20 grs. or more, 2 or 3 times a day, in pills or solution, either alone or combined with iodine; in bronchocele, scrofula, chronic rheumatism, dropsy, syphilis, and various glandular diseases. It is also used externally, made into a lotion or ointment.

POTASSIUM, PHOSPHURET. Obtained by gently heating phosphorus with potassium.

POTASSIUM, SULPHURET OF. *Syn.* Liver of Sulphur. Sulphuret of Potash. Hepar Sulphuris. Kali Sulphuretum, (P. L. 1788.) Potassæ Sulphuretum, (P. L. 1809, 1824, and P. D.) Potassii Sulphuretum, (P. L. and E.) *Prep.* (P. L.) Sulphur ℥j; carbonate of potash ℥iv; mix, and heat them in a covered crucible till they unite. *** It dissolves in water, yielding a fetid yellow solution, and in acids evolving strong fumes of sulphureted hydrogen. *Dose.* 2 to 4 grs. in solution, or made into pills with soap; in obstinate skin diseases. It is chiefly used externally made into a lotion, (1 to 2 drs. to the pint,) or an ointment, (30 grs. to the oz.) It is poisonous in large doses. *** Besides the above, there are other compounds of sulphur and potassium distinguished by chemists.

POTESTATES SUCCINI. *Prep.* Oil of amber ℥j; sesquicarbonate of ammonia ℥ss; alcohol ½ pint; digest 4 days, and decant. *Dose.* 10 to 40 drops, externally, in hooping cough.

POTION. Potus.

POUDRE A LA MARESCHALLE. *Prep.* 1. Oak moss 2 lbs.; starch 1 lb.; cloves and calamus aromaticus, of each 1 oz.; Cyprus and rotten oak wood, of each 2 oz.; all in fine powder; mix, and pass through a sieve.—2. Starch powder 28 lbs.; powdered cloves ¾ lb.; mix as last.

POUDRE CLARIFICANTE. Powdered albumen.

POUDRE DE CHIPRE. *Prep.* 1. Wash oak moss for 3 days in running water; dry, powder, and perfume it once or twice with jasmine or musk rose flowers, then add other scent.—2. (*Poudre de Chipre de Montpellier.*) Poudre de chipre, as last, 2 lbs.; musk 30 grs.; civet 18 grs.; the last two ground with a little sugar.

POUDRE DE FLEURS D'ORANGES. *Prep.* Starch powder 25 lbs.; orange flowers 1 lb.; mix in a covered chest; stir 2 or 3 times a day, and repeat the process with fresh flowers a second and a third time.

POUDRE DE FRANGIPANE. *Prep.* Poudre de fleurs d'oranges and poudre de chipre, of each 6 lbs.; essence of ambergris 1 oz.; civet powdered with sugar ½ dr.; mix well. Ash gray.

POUDRE DE JASMINE. As poudre de fleurs d'oranges, using jasmine flowers.

POUDRE DE JONQUILLE. As the last, using jonquilles.

POUDRE KUSIQUE. *Prep.* Nitre and sulphur, of each 50 parts; powdered charcoal and antimony, of each 1 part; mix and divide into doses of 2 grammes, and put three doses in each packet. Given to dogs in a ball of butter, to prevent the disorders to which they are liable. A popular French nostrum.

POUDRE DE ROSES. *Prep.* 1. (*Poudre de Roses communes.*) As poudre de fleurs d'oranges, but leaving the box open, and changing the flowers in 24 hours.—2. (*Poudre de Roses Musquées.*) As the last, but using musk roses and shutting the chest.

*** All the above perfumed powders are used as cosmetics for the hair.

POULTICE. *Syn.* Cataplasm. Cataplasma. (*Lat.*, from καταπλασσω, *to spread like a plaster.*) Poultices are external applications used to promote suppuration, allay pain and inflammation, resolve tumors, &c. The following are the poultices of the pharmacopœias:—

POULTICE, CHARCOAL. *Syn.* Cat. Carbonis Ligni. *Prep.* (P. D.) Charcoal recently ignited and cooled in a close vessel, mixed with simple poultice. In fetid and gangrenous sores, frequently renewed.

POULTICE, HEMLOCK. *Syn.* Cataplasma Conii. *Prep.* (P. L.) Extract of hemlock ℥ij; water 1 pint; dissolve and thicken with linseed meal. In painful nipples, cancer, glandular tumors, irritable sores, &c.

POULTICE, LINSEED. *Syn.* Cat. Lini. *Prep.* (P. L.) Linseed meal made into a stiff paste with water. *Used* to promote suppuration. A little oil should be added, and some smeared over the surface as well, to prevent its getting hard. *** For small gatherings, as of the finger, a little chewed bread and butter is an efficient and convenient substitute.

POULTICE, MUSTARD. *Syn.* Cat. Sinapis. *Prep.* (P. L.) Equal parts of flour of mustard and linseed meal, made into a poultice with hot vinegar. As a powerful counter-irritant, stimulant, and rubefacient; in low fevers, &c. It should not be left on long enough to raise a blister.

POULTICE, YEAST. *Syn.* Cat. Fermenti. *Prep.* (P. L.) Flour lb. j; yeast ½ pint; mix and apply a *gentle* heat till they begin to swell. In gangrenous or foul ulcers, &c.

POUNCE. Powdered gum sandarach. (For *Liquid pounce* see Indelible Ink.)

POWDER, ALOES. The powdered Socotrine aloes of the shops is mostly a factitious article made by grinding together equal parts of Cape and hepatic aloes. (See Aloes.)

POWDER, ALOES, (COMP.) *Syn.* Pulvis Aloes compositus. *Prep.* (P. L.) Aloes ℥iss; guaiacum resin ℥j; compound cinnamon powder ℥ss; powder and mix. Purgative and sudorific. *Dose.* 10 to 20 grs.

POWDER, ANTIMONIAL. *Syn.* Fever Powder. James's do. Pulvis Antimonii comp. (P. L.) P. Antimonialis, (P. E. & D.) P. Jacobi. P. Febrifugus Jacobi. *Prep.* (P. L.) Sesquisulphuret of antimony lb. j; hartshorn shavings lb. ij; powder, mix; throw them into a red-hot crucible, and stir constantly until vapor no longer arises; cool, powder, put it into a crucible with a perforated cover, and calcine at a red heat for 2 hours; reduce the residue to fine powder. *Dose.* 3 to 8 or 10 grs. as a febrifuge and diaphoretic, in fevers, rheumatic affections, and chronic skin diseases. It is a very uncertain and variable preparation. (See Antimonious Acid.) *** A factitious article, made by adding 1 oz. of tartar emetic to 18 or 19 oz. of burnt hartshorn, is frequently sold in the shops for antimonial powder.

POWDER, AROMATIC. *Syn.* Pulv. Aromaticus. *Prep.* (P. E.) Cinnamon, cardamom seeds, and ginger, equal parts; powder and mix. Aromatic and carminative. *Dose.* 10 to 30 grs.

POWDER, ASARABACCA. *Syn.* Pulv. Asari Comp. *Prep.* (P. D.) Asarabacca leaves ℥j; lavender flowers ʒj; both dried; mix and powder. *Used* as an errhine in headache and ophthalmia. (See Asarabacca Snuff.)

POWDER, BASILIC. *Syn.* ROYAL POWDER. PULV. BASILICUS. *Prep.* Scammony, calomel, cream of tartar, and cerussa antimonii, (antimonic acid,) equal parts; powder and mix. The compound powder of scammony is now universally substituted.

POWDER, CHALK, (COMPOUND.) *Syn.* PULV. CRETÆ COMP., (P. L. E. & D.) *Prep.* (P. L.) Prepared chalk lb. ss; cinnamon ℥iv; tormentil and gum acacia, of each ℥iij; long pepper ℥ss; powder and mix. Aromatic, astringent, and antacid; in atonic diarrhœa. *Dose.* 10 to 30 grs. *** The following form is used by many wholesale houses: prepared chalk 4 lbs.; powdered cassia 2 lbs.; do. calamus aromaticus ¾ lb.; do. gum 1½ lbs.; long pepper ¼ lb.; mix.

POWDER, CHALK, (WITH OPIUM.) *Syn.* PULV. CRETÆ COMP. CUM OPIO, (P. L. & D.) PULV. CRETÆ OPIATUS, (P. E.) *Prep.* I. (P. L.) Compound chalk powder ℥viss; powdered opium ℈iv; mix.—2. (*Wholesale.*) Compound chalk powder 21¼ oz., (avoird.;) powdered opium ʒiv, (troy;) mix. *Dose.* 10 to 30 grs. in diarrhœa.

POWDER, CINNAMON, (COMPOUND.) *Syn.* AROMATIC POWDER. PULV. CINNAMONI COMP. (P. L.) P. AROMATICUS, (P. D.) *Prep.* (P. L.) Cinnamon ℥ij; cardamoms ℥iss; ginger ℥j; long pepper ℥ss; powder and mix. *Dose.* 10 to 30 grs.; as an aromatic and carminative. *** In the powder of the shops cassia is almost universally substituted for cinnamon.

POWDER, COLOCYNTH, (PULP.) A factitious article is met with in trade, made by grinding bryony root 1 lb.; with colocynth seeds 3 lbs.; adding a very small quantity of gamboge.

POWDER, CRYSTAL. From quartz, like POWDERED GLASS. *Used* to make glass and as a dryer for paints.

POWDER, CURRIE. *Syn.* INDIAN CURRIE POWDER. *Prep.* 1. Coriander seeds and black pepper, of each 8 lbs.; turmeric and cumin seeds, of each 4 lbs.; (all in powder,) mix. *** This receipt is employed by a wholesale house that does very largely in currie powder.—2. Coriander seeds 1¼ lb.; black pepper 3 oz.; cayenne do. 1 oz.; turmeric and cumin seeds, of each ¼ lb.; fenugreek seed ½ oz.; mix.—3. To No. 1, add cayenne ¼ lb. *Used* as a sauce and condiment.

POWDER, FILTERING. Pure clay or fuller's earth, dried by a gentle heat, and ground to powder. *Used* to filter and bleach oils. (See FILTRATION.)

POWDER, FLY. *Prep.* White arsenic 4 oz.; white sugar 6 lbs.; rose pink 1 oz.; mix, and put 6 drs. in each paper. *Used* to kill flies. *** It is poisonous, and should be employed with great caution, especially where there are children.

POWDER, ESCHAROTIC. *Syn.* PULV. ESCHAROTICA ARSENICALIS. POUDRE CAUSTIQUE DU FRERES COSME OU DE ROUSSELOT. *Prep.* (P. Cod.) Finely powdered cinnabar and dragon's blood, of each 16 grs.; do. arsenious acid 8 grs.; mix *Used* to cauterize cancerous wounds, but should be applied with great caution, and only to a small surface. It is made into a paste with the saliva when used, and is hence called *Arsenical Paste*, (Pasta Arsenicalis.)

POWDERS, GINGER BEER. *Prep.* Powdered white sugar 2 dr.; powdered ginger 5 grs.; carbonate of soda 26 grs.; mix, and wrap in blue paper; tartaric acid 30 grs.; wrap in white paper For use dissolve each separately in half a glass of water, mix, and drink while effervescing.

POWDER, HAIR. Starch powdered and sifted very fine, and scented at pleasure. (See POUDRE.)

POWDERS, INK. *Prep.* Aleppo galls 3 lbs.; copperas (dry but not calcined) 1 lb.; gum arabic 6 oz.; white sugar 2 oz.; all in powder; mix. *** 1 pint of boiling water poured on 1½ or 2 oz., makes a pint of ink.

POWDER, IPECACUANHA, (COMPOUND.) *Syn.* DOVER'S POWDER. PULV. DOVERI. P. IPECACUANHÆ COMP., (P. L. E. & D.) *Prep.* 1. (P. L.) Powdered ipecacuanha and hard opium, of each ʒj; do. sulphate of potash ℥j; mix.—2. (*Wholesale.*) Powdered ipecacuanha and opium, of each 1 lb.; do. sulphate of potash 8 lbs.; mix. A powerful and valuable sudorific. *Dose.* 5 to 15 grs.; in inflammatory affections, rheumatisms, colds, &c.

POWDER, JALAP, (COMP.) *Syn.* PULV JALAPÆ COMP. (P. L. E. & D.) *Prep.* (P. L.) Jalap ℥iij; cream of tartar ℥vj; ginger ʒij; all in powder; mix. *Dose.* 20 to 60 grs. as a purgative in habitual costiveness, dropsies, &c.

POWDER, KINO, (COMP.) *Syn.* PULV. KINO COMP. *Prep.* (P. L.) Kino ʒxv; cinnamon ℥ss; hard opium ʒj; powder and mix well. *Dose.* 5 to 20 grs. in diarrhœa, &c.

POWDER, MERCURIAL. *Syn.* QUICKSILVER WITH CHALK. HYDRARGYRUM CUM CRETA, (P. L. E. & D.) *Prep.* I. (P. L.) Mercury ℥iij; prepared chalk ℥v; triturate till the globules disappear. *Dose.* 5 to 30 grs. as a mild mercurial. *** "When pure, part is evaporated by heat; what remains is colorless, and totally soluble in acetic acid with effervescence; this solution is not colored by sulphureted hydrogen. These substances can scarcely be so diligently triturated that no globules shall be visible." (P. L.) As commonly met with, this powder contains too little mercury. When properly prepared, it effervesces when digested in cold dilute acetic acid, and the dark undissolved portion when dried should be equal to about ⅜ of the weight of the powder employed; it should also be totally dissipated by heat, without incandescence, and readily and entirely soluble in nitric acid; when examined by the microscope it should exhibit minute globules of mercury unmixed with foreign matter. The Dublin Ph. orders precipitated chalk.

II. (Tyson.) Calomel ℥iv; liquor of potassa f℥vj or q. s.; rub together, add liquor of ammonia ℥ss, and again triturate; decant the clear, well wash and gently dry the bluish powder, and mix it with twice its weight of prepared chalk. Stronger than the former.

III. (*Mercury with Magnesia, Hydrargyrum cum Magnesia*, P. D.) Mercury and manna, of each 8 parts; triturate together (adding enough water to make a paste) till the globules disappear, then add carbonate of magnesia 1 part, mix, and further add warm water 64 parts; again well mix, and after repose decant the clear; repeat the washing with fresh water a second and third time then add 3 parts more of carbonate of magnesia, mix well, and dry on bibulous paper. *Uses* and *dose* the same as of mercury and chalk.

IV. (*Quicksilver and Sugar. Mercurius Saccharatus.*) Quicksilver and white sugar, of each ℥j; oil of tansy ʒss; triturate till the globules disappear. *Dose.* ʒj, as a vermifuge.

POWDER, PEARL, (COSMETIC.) *Prep.* Pure pearl white, (*trisnitrate of bismuth,*) and French chalk scraped fine by Dutch rushes, equal parts, mix. Some add more French chalk. A skin cosmetic. This is preferable to pearl white alone, from being more adhesive.

POWDER, PLATE. *Prep.*—1. Quicksilver with chalk 1 oz.; prepared chalk 7 oz.; mix.—2. Polisher's putty, and burnt hartshorn, of each ½ lb.; prepared chalk 1 lb. *Used* to clean and polish plate.

POWDER, PLATE BOILING. *Prep.* Cream of tartar, common salt, and alum, equal parts; mix. A *little* of this powder, added to the water in which plate is boiled, gives it a silvery whiteness.

POWDER, PLUMMER'S. *Syn.* ÆTHIOPS PLUMMERI. *Prep.* Calomel, and sulphuret of antimony, equal parts. Alterative.

POWDER, PORTLAND, (DUKE OF.) *Syn.* PULV. DUCIS PORTLANDIÆ. *Prep.* Roots of gentian and birthwort; tops and leaves of germander, ground pine, and lesser centaury, of each equal parts; powder and mix. For gout.

POWDER, RHUBARB, (COMP.) *Syn.* GREGORY'S POWDER. PULV. RHÆI COMP. *Prep.* (P. E.) Magnesia ℔. j; rhubarb ℥iv; ginger ℥ij; all in fine powder; mix, and preserve it in a corked bottle. An excellent antacid, stomachic, and mild purgative. *Dose.* 20 to 30 grs.

POWDER, SCAMMONY, (COMPOUND.) *Syn.* BASILIC POWDER. ROYAL DO. PULV. BASILICUS. P. SCAMMONII COMP., (P. L. E. and D.) *Prep.* 1. (P. L.) Scammony, and hard extract of jalap, of each ℥ij; ginger ℥ss; powder and mix. *Dose.* 10 to 20 grs.—2. (P. E.) Scammony, and bitartrate of potash, equal parts; triturate together to a very fine powder. *Dose.* 15 to 30 grs Both are used as cathartics in worms, especially for children.

POWDERS, SCENT. *Prep.* 1. Corianders, orris root, rose leaves, and calamus aromaticus, of each 4 oz.; lavender flowers 8 oz.; rhodium wood 1 dr.; musk 20 grs.; mix, and reduce to coarse powder.—2. Corianders, orris, calamus aromaticus, and red roses, of each 1 oz.; lavender flowers 2 oz.; mace and cloves, of each 1 dr.; essential oil of almonds 10 drops; mix as last.—3. As last, but substitute musk 3 grs. for oil of almonds. *Used* to fill scent bags, and for boxes, &c.

POWDERS, SEIDLITZ. *Prep.* 1. Tartrate of soda ʒij; carbonate of do. ℈ij; mix, and put it in a blue paper; tartaric acid 35 grs., to be put in white paper. For ½ pint of water, as ginger-beer powders. Laxative.—2. (*In one bottle.*) Tartrate of soda 12 oz.; carbonate of do. 4 oz.; tartaric acid 3½ oz.; white sugar 1 lb.; all in fine powder; dry each separately by a gentle heat, add essence of lemon 20 drops; mix well, pass it through a sieve, and put it at once into clean dry bottles. *Dose.* A dessert-spoonful to a glass of water.

POWDER, SENNA. (*Battley's Green.*) Senna leaves uried and heated till they turn yellow, then powdered along with (blue) charcoal, q. s. to give a green color.

POWDER, SILVERING. *Prep.* 1. Silver dust (fine) 20 grs.; alum 30 grs.; cream of tartar, and common salt, of each ¼ oz.; powder and mix.—2. Silver dust 1 oz.; common salt and sal ammoniac, of each 4 oz.; corrosive sublimate ¼ oz.; mix as last. *Used* to silver copper previously well cleaned, by friction, adding a little water to form a paste.

POWDERS, SODA. *Syn.* EFFERVESCING POWDERS. SALINE DO. AERATED SODA DO. *Prep.* Carbonate of soda 30 grs. in each blue paper; tartaric acid 25 grs. in each white paper; dissolve each separately in ½ of a glass of water, mix, and drink immediately. A cooling, wholesome summer beverage. *** MIDGELEY'S SODA POWDERS are made by adding ⅛ of a grain of tartarized antimony to each paper of acid. Refrigerant and diaphoretic.

POWDERS, SPRUCE BEER. As gingerbeer powders, substituting essence of spruce 3 or 4 drops, for the powdered ginger.

POWDER, TIN. *Syn.* TIN FILINGS. GRAIN TIN. PULVIS STANNI, (P. E. and D.) *Prep.* 1. (P. E.) Melt tin in an iron vessel, pour it into an earthenware mortar heated a little above its melting point, and triturate briskly as the metal cools, then sift the product and repeat the process.—2. Pour melted tin into a wooden box, the inside of which is rubbed with chalk, and shake violently till the metal is reduced to powder, then sift as before. *Dose.* 2 to 4 drs., as a vermifuge. *** Polishers' putty, colored with ivory black, is frequently substituted for this powder, and hence arise the ill effects that sometimes follow its use.

POWDERS, TOOTH. *Prep.* 1. Red bark, and Armenian bole, of each 1 oz.; powdered cinnamon, and bicarbonate of soda, of each ½ oz.; oil of cinnamon 2 or 3 drops; all in fine powder; mix. (Lancet.)—2. Substitute cassia for cinnamon, and cream of tartar, carbonate of magnesia, or prepared chalk, for bicarbonate of soda.—3. (*Grosvenor's.*) Rosepink 3 lbs.; orris powder ½ lb.; oyster shells 2½ lbs.; oil of rhodium 25 drops; as above.—4. (*Asiatic dentifrice.*) Prepared red coral 8¼ lbs.; Venetian red ¾ lb.; ochre and pumice-stone, of each 1¼ lb.; China musk 30 grs.; all in fine powder; mix.—5. (*Hemet's dentifrice.*) Cuttlefish bones 6 oz.; cream of tartar 1 oz.; orris root ½ oz.; as last.—6. (*Ruspini's dentifrice.*) Cuttlefish bones 8 oz.; roach alum and orris root, of each 1 oz.; cream of tartar 2 oz.; oil of rhodium 6 drops; as before. (See COSMETICS.)

POWDER, TRAGACANTH, (COMPOUND.) *Syn.* PULV. TRAGACANTHÆ COMP., (P. L. and E.) *Prep.* (P. L.) Tragacanth, gum arabic, and starch, of each ℥iss; white sugar ℥iij; powder and mix. Demulcent, and as a vehicle.

POWDER, VERMIFUGE. *Prep.* 1. (Collier.) Powdered jalap and scammony, of each ʒj; cream of tartar ʒij; Ethiop's mineral ʒiij; mix. *Dose.* 10 to 20 grs., for children.—2. (E. H.) Scammony and calomel, of each ʒj; rhubarb ʒiij; all in fine powder; mix. *Dose* 15 to 30 grs. or more.

POWDER, VIOLET. *Prep.* 1. Powdered starch 28 lbs.; do. orris root 1 lb.; essence of bergamotte ¼ oz.; oil of rhodium ½ dr.; mix and pass through a sieve.—2. Powdered starch scented with a little bergamotte. *Used* as a dusting powder in excoriations, and for children.

POWDER, WARWICK, (EARL OF.) *Syn.* PULV. COMITIS WARWICENSIS. *Prep.* Scammony 4 oz.; diaphoretic antimony 2 oz.; cream of tartar 1 oz.; all in fine powder; mix.

POX, CHICKEN. *Syn.* WATERPOX. VARICELLA. (Dim. of *Variola.*) An eruptive skin disease, consisting of smooth vesicles of various sizes, which afterwards become white and straw colored, and about the fourth day break and scale off. In hot weather the discharge sometimes becomes purulent, and at others the eruption is attended with considerable fever. The treatment consists in the adoption of a light vegetable diet, and in the administration of mild aperients and cooling drinks.

POX, COW. *Syn.* VACCINIA. VARIOLA VACCINA. This disease was proposed as a substitute and preventive of smallpox, by Dr. Jenner in 1798. The success which has followed its artificial production has nearly led to the extinction of smallpox in England. The process of *vaccination* is similar to that of *inoculation* for the smallpox, before noticed. About the third day the puncture usually becomes red and elevated, and continues to enlarge and become vesicular, until at about the 8th or 9th day, it is at its height, and the vesicle is surrounded with a florid areola. About the eleventh or twelfth day these symptoms decline; the centre of the pustule becomes brown, and a dark scale gradually forms and separates, leaving the arm as heretofore. This disease seldom requires medical treatment; but should febrile symptoms come on, an aperient may be given.

POX, SMALL. *Syn.* VARIOLA. (From *varius*, changing color, because of its action on the skin.) This disease comes on with the usual symptoms of inflammatory fever. About the third day, red spots, resembling flea bites, make their appearance on the face and head, and gradually extend over the whole body. About the fifth day small circular vesicles, depressed in the centre, surrounded by an areola, and containing a colorless fluid, begin to form, when the feverish symptoms abate; about the sixth day the throat becomes sore; about the eighth day the face is swollen, and about the eleventh day the pustules acquire the size of a pea, and cease to enlarge, the matter which they contain becomes opaque and yellow, a dark central spot forms on each, the swelling of the face subsides, and secondary symptoms of fever come on; the pustules become rough, break and scab over, and a dark spot remains for some days, often followed by permanent indentation. At the end of the sixteenth or eighteenth day, the symptoms usually disappear. In the *confluent* smallpox, the pustules coalesce, the eruption is irregular in its progress, and the inflammatory symptoms are more severe. The treatment of ordinary cases of smallpox resembles that mentioned above for *chicken-pox.* When great irritability exists, small doses of morphia, opium, or camphor, may be administered, and obstinate vomiting arrested by effervescing saline draughts. The application on the third day of a mask formed of thick muslin, covered with mercurial ointment, and having holes cut out for the nostrils, eyes, and mouth, will effectually prevent "*pitting.*" (Dr. Stewardson.) Gold leaf is also applied for the same purpose.

PRADIER'S CATAPLASM. *Prep.* Balm of Mecca ʒvj; rectified spirit of wine ℥xvj; dissolve; red cinchona bark, sarsaparilla, and sage, of each ℥j; saffron ʒss; rectified spirit of wine ℥xxxij; digest for 48 hours, filter, mix the two liquors, and add twice their weight of lime water. In gout, f℥ij sprinkled on the surface of a hot linseed-meal poultice sufficiently large to surround the affected part. *** The Emperor Napoleon gave £2500 for this receipt.

PRECIPITATE, GREEN. *Syn.* MERCURIUS PRÆCIPITATUS VIRIDIS. LACERTA VIRIDIS. *Prep.* Quicksilver ℥j; nitric acid f℥iss; dissolve; copper ℥j; nitric acid f℥j; water f℥iss; dissolve; mix the solutions, evaporate to dryness, and calcine till red fumes cease to arise. Caustic.

PRECIPITATE, WHITE. *Syn.* COSMETIC MERCURY. AMMONIATED MERCURY. MURIATE OF AMMONIA AND MERCURY. AMMONIATED SUBMURIATE OF MERCURY. AMMONIACAL OXYCHLORURET OF DO. CHLORAMIDE OF DO. CHLORO-AMIDIDE OF DO. MERCURIUS PRÆCIPITATUS ALBUS, (P. L 1745.) CALX HYDRARGYRI ALBA, (P. L. 1788.) HYDRARGYRUS PRÆCIPITATUS ALBUS, (P. L. 1809.) HYDRARGYRUM PRÆCIPITATUM ALBUM, (P. L. 1824, & P. E.) HYDRARGYRI AMMONIO CHLORIDUM, (P L. 1836.) HYDRARGYRI SUBMURIAS AMMONIATUM, (P. D.) *Prep.* I. (P. L.) Bichloride of mercury ℥vj; distilled water 3 quarts; dissolve, and add liquor of ammonia f℥viij; wash and dry the precipitate.

II. Corrosive sublimate and sal ammoniac, of each ℥vij; dissolve in water 3 quarts, and precipitate with liquor of potassa. Some use only 4 oz. of sal ammoniac.

Remarks. A white, inodorous solid or powder, insoluble in alcohol, partially soluble in boiling water, and wholly dissolved by sulphuric, nitric, and muriatic acids, without effervescence. It is "totally dissipated by heat. Digested with acetic acid, it yields no yellow or blue precipitate with iodide of potassium. Its powder triturated with lime water does not become black. When heated with solution of potash it exhales ammonia, and assumes a yellow color." (P. L.) *Used* to make an ointment, in various skin diseases, &c.

PRESERVES AND PRESERVING. (See FRUITS, JELLIES, JAMS, MARMALADES, CONSERVES, &c.)

PRINTING INK. *Syn.* ENCRE D'IMPRIMERIE, (*Fr.*) BUCHDRUCKERFARBE, (*Ger.*) *Prep.*—1. THE VARNISH. 10 or 12 gallons of linseed oil are set over the fire in an iron pot, capable of containing at *least* as much more, to allow of its swelling up without running over. When it boils it is kept stirred with an iron ladle, and if it does not take fire of itself soon after the smoke begins to rise, it is kindled by means of a piece of burning paper, stuck in the cleft end of a long stick. The pot is then shortly afterwards removed from the fire, and the oil is suffered to burn for about half an hour, or till a sample of the varnish cooled upon a pallet knife, may be drawn into strings of about half an inch long, between the fingers. The flame is now extinguished by the application of a closely-fitting tin cover, and as soon as the froth of the ebullition has subsided, black rosin is added, in the proportion of 6 lbs. to every 6 quarts of oil thus treated; the mixture is next stirred until the rosin is dissolved, when 1¾ lbs. of brown soap, cut into slices, is fur-

each case, diluting the mixture with lard to suit it to the state of irritability of the part. (See ACETIC ACID.)

ROB. (*Arab.*, dense.) A term formerly applied to an inspissated vegetable juice.

ROCELLINE. *Syn.* ROCELLIC ACID. A fatty crystallizable substance, obtained from rocella tintoria, or dyer's orchil.

ROLL, WINE. *Prep.* Soak a French roll, or sponge-biscuit, in raisin or sherry wine, surround it by a custard or cream thickened with eggs, and add some spice and ornaments.

ROSACIC ACID. The red crystalline substance deposited by the urine of persons laboring under intermittent or nervous fevers. It is purified by alcohol.

ROUGE. *Syn.* ROUGE FOR THE TOILETTE. ROUGE D'ESPAGNE; FARD, (*Fr.*) *Prep.* Wash safflowers (any quantity) until the water comes off colorless; dry, powder, and digest in a weak solution of carbonate of soda; then place some fine cotton wool at the bottom of the vessel, and throw down the coloring matter by gradually adding lemon juice or white vinegar till it ceases to produce a precipitate. Next wash the cotton in cold water, then dissolve out the color with a fresh solution of soda, add a quantity of finely-powdered talc, or French chalk, proportional to the intended quality of the rouge; mix well, and precipitate as before; lastly, collect the powder, dry with great care, and triturate it with a *minute* quantity of oil of olives, to render it smooth and adhesive. *** This is the only article which will brighten a lady's complexion without injuring the skin. The relative fineness and proportion of talc employed determines the quality of the rouge.

†‡† *Rouge Indienne* is the terra persica, or Indian red, imported from Ormuz;—*Liquid Rouge*, the red liquid left from the preparation of carmine, or a solution of carmine in weak carbonate of potash water, or of pure rouge in alcohol acidulated with acetic acid;—*Rouge de Prusse*, burnt yellow ochre;—*Vert Rouge d'Athènes*, or "pure rouge," is obtained from safflowers as above, but without the use of any talc or French chalk; intense copper-bronze color when dry; red when moistened or diluted;—*Spanish Lady's Rouge* is cotton wool repeatedly wetted with ammoniacal solution of carmine, and dried.

ROUSSEAU'S DROPS. *Syn.* GOUTTES DE L'ABBE ROUSSEAU. VINUM OPII FERMENTATIONE PARATUM. *Prep.* Honey ℥xij; warm water lb. iv; set in a warm place till it begins to ferment, then add opium ℥iv; dissolved in water f℥xij; ferment for 1 month, filter, evaporate to ℥x; strain, and add rectified spirit ℥ivss. Milder than common laudanum. *Dose.* 5 to 30 drops.

ROYAL PREVENTIVE. *Syn.* WHITE WASH. A quack lotion formed of solution of diacetate of lead and proof spirit, of each ℥j; water 1 pint. *Used* against infection.

RUM. *Syn.* SPIRITUS SACCHARI. An ardent spirit obtained by distillation from the fermented skimmings of the sugar-boilers, (*sirup scum*,) the drainings of the sugar pots and hogsheads, (*molasses*,) the washings of the boilers, and occasionally the juice of the sugar-cane. Rum is imported from the West Indies, and the best comes from Jamaica. *Leeward Island Rum* is less esteemed. Rum owes its flavor to a volatile oil and butyric acid. The duty on West India rum is 9*s.* per proof gallon; that on East India 15*s.*; the latter amounts to a prohibition. The consumption of rum has long been declining in England; its place being supplied by gin or British brandy. In Jamaica it is usual to put sliced pine-apples into the puncheons containing the finer qualities of rum, which is then termed *pine-apple rum*. (See ALCOHOL.)

RUPERT'S DROPS are made by letting drops of melted glass fall into cold water; the drop assumes by that means an oval form with a tail or neck resembling a retort. They possess this singular property, that if a small portion of the tail is broken off, the whole bursts into powder with an explosion, and a considerable shock is communicated to the hand that grasps it.

RUSKS. *Prep.* 7 eggs well beaten; new milk ½ pint; melted butter ¼ lb.; yeast ¼ pint; sugar 3 oz.; beat well together with as much flour, added gradually, as will make a very light paste; let it rise before the fire for half an hour, then add a little more flour, form into small loaves or cakes 5 or 6 inches wide, and flatten them; bake moderately, and when cold, cut them into slices the size of rusks, and put them into the oven to brown a little. A nice tea-cake when hot, or with caraways to eat cold.

RUTILINE. A name given by Braconnot to the product of the decomposition of salicine by sulphuric acid. A brownish red solid, colored blood-red by acids, and violet by alkalis.

SABADILLIC ACID. *Syn.* CEVADIC ACID. A crystalline, fusible, volatile, fatty acid, obtained from the oil extracted by ether from the seeds of veratrum sabadilla. The sabadillate of baryta is prepared in the same way as the butyrate of baryta is from butter. When this salt is heated with concentrated phosphoric acid, the sabadillic acid sublimes in white needles. It has an odor resembling butyric acid.

SABADILLINA. An alkaloid obtained by Couerbe from cebadilla seeds. According to Simon, it is merely a compound of the resinates of soda and veratria.

SACCHARIC ACID. *Syn.* OXALHYDRIC ACID. *Prep.* Sugar or gum 1 part; nitric acid 2 parts; diluted with water 10 parts; dissolve by the aid of heat, and continue the heat as long as reaction takes place, then neutralize by carbonate of lime, precipitate by acetate of lead, and decompose the precipitate, suspended in water, by sulphureted hydrogen; neutralize the filtered liquid with potash, concentrate, and crystallize; redissolve the resulting *saccharate of potassa*, decolor by animal charcoal, reprecipitate by acetate of lead, and decompose the precipitated saccharate of lead by sulphureted hydrogen, as before. It forms salts with the bases called *Saccharates*.

SACCHAROMETER. (From *saccharum*, sugar, and *metrum*, a measure.) An hydrometer for determining the sp. gr. of brewer's and distiller's worts. (See HYDROMETER and BREWING.)

SACCHULMIC ACID. A light brown powder, obtained by Malaguti and Boullay, by boiling sugar along with dilute sulphuric acid It is solu-

dilute muriatic acid, and then in pure water; drain and dry. Superior.

IV. (*Paris Blue.*) Neutralize the solution of prussiate of potash above, with dilute sulphuric acid, and precipitate with a solution of any persalt of iron, (as the persulphate, nitrate, sesquichloride, or peracetate;) well wash, and dry the precipitate. A very rich and intense color.

V. (Hochstätter.) Crystallized prussiate of potash and green vitriol, of each 6 parts; dissolve each separately in water 15 parts; then add oil of vitriol 1 part; fuming muriatic acid 24 parts; agitate well. After some hours, treat the whole with chloride of lime 1 part, dissolved in water 80 parts, and strained, observing to stop the addition of the latter solution as soon as an effervescence from the escape of chlorine gas is observed; after standing some hours, thoroughly wash the precipitate, and dry it; or, instead of the above, at once wash the precipitate in dilute nitric acid, till it acquires a deep-blue color. *Product.* Of the finest quality.

Remarks. The object of employing alum is to prevent or lessen the precipitation of oxide of iron by the free alkali in the blood lye, but a portion of alumina is in consequence thrown down with the blue, and tends to render it paler, and increase the product. The same purpose is effected by neutralizing the alkali with dilute sulphuric acid, and omitting the alum from the precipitating solution; but in this case, if green copperas is employed, it will be necessary to treat it with very dilute muriatic acid, to remove the excess of peroxide of iron, before the precipitate acquires its full richness of color. The quantity of alum employed may be varied according to the shades of the intended blue. The quality of Prussian blue may be estimated by its color, and by the quantity of potash or soda required to destroy its blue color. If it effervesces with acids, it contains chalk; and if it forms a paste with boiling water, it is adulterated with starch. It is pure, if, "after being boiled with dilute muriatic acid, ammonia throws down nothing from the filtered liquid." (P. L.) It has been occasionally used in medicine, but is principally employed as a pigment. It is purgative, and not poisonous. *_* Prussian blue is distinguished from indigo by exhibiting a coppery tint when broken, but which is removed by rubbing with the nail.

PRUSSIATE OF POTASH. *Syn.* FERROPRUSSIATE OF POTASH. TRIPLE DO. DO. FERRURETED HYDROCYANATE OF DO. FERROCYANATE OF DO. FERROCYANIDE OF POTASSIUM. CYANURE FERROSO-POTASSIQUE, (Berzelius.) FERROCYANURE DE POTASSIUM; PRUSSIATE JAUNE DE POTASSE, (*Fr.*) KALIUM EISENCYANUR; CYANEISEN KALIUM, (*Ger.*) POTASSII FERROCYANIDUM, (P. L. & E.) *Prep.* I. Dried blood, horns, or hoofs, 5 parts; good pearlash 2 parts; both reduced to coarse powder, mix, and inject into an egg-shaped iron pot in a state of moderate ignition; stir well with an iron spatula, so as to prevent it running together, and continue the calcination till fetid vapors cease to be evolved. During the latter part of the process, the pots should remain covered, and only occasionally stirred. The calcination is known to be finished when flame is no longer seen on stirring the mixture. When this is the case, remove the pasty mass with an iron ladle, and when cold, dissolve in water; filter or defecate, and evaporate, that crystals may form on cooling; redissolve in hot water, and cool very slowly, when large and beautiful yellow crystals will be deposited. *_* The *greaves* obtained from the tallow-chandlers are employed as an economical substitute for horns or blood, by one of the largest Scotch manufacturers; but blood is the best where it can be procured, and after that, horns and hoofs.

II. (L. Thompson.) Potash or pearlash, and coke, cinders, or coal, of each 10 parts; iron turnings 5 parts; all in coarse powder; mix, and expose for half an hour to a full red heat in an open crucible, stirring occasionally till small jets of purple flame are no longer seen, then cool, dissolve out the soluble matter, and proceed as above. If this solution be precipitated by sulphate of iron, and the precipitate brightened by muriatic acid, as before described, 25% of the weight of the pure potash employed, will be obtained in Prussian blue.

III. (*Pure.*) Fuse effloresced commercial prussiate of potash in a glass vessel, dissolve in water, neutralize with acetic acid, precipitate with strong alcohol, wash the precipitate with a little weak alcohol, redissolve in water, and crystallize.

Remarks. The yellow prussiate of potash is chiefly used in dyeing and calico printing, and in chemistry, as a test and a source of prussic acid. When pure, it is totally dissolved by water; loses 12·6% of its weight by a gentle heat; scarcely, if at all, alters the color of turmeric; is precipitated deep blue by the sesquisalts of iron, and white by zinc; its ashes dissolved by muriatic acid, are again thrown down by ammonia; it yields 18·7% of sesquioxide of iron. (P. L.) *_* FERROCYANIDE OF IRON precipitates solutions of *antimony*, *bismuth*, *protoxide of mercury*, and *zinc*, white—*Cadmium*, pale yellowish white—*Protoxide of cerium*, white, soluble in acids—*Protoxide of copper*, white, changing to red—*Protoxide of iron*, white, rapidly turning blue—*Lead*, white, with a pale yellowish cast—*Protoxide of manganese*, white, rapidly passing into peach or blood-red—*Peroxide of mercury*, white, turning blue—*Oxide of nickel*, white, turning green—*Silver*, white, turning brown in the light—*Protoxide of tin*, white, (gelatinous) *Cobalt*, green, turning reddish gray—*Peroxide of copper*, brown-red—*Peroxide of iron*, dark blue—*Deutoxide of manganese*, greenish gray—*Molybdenum*, dark brown—*Protoxide of palladium*, green, (gelatinous)—*Tantalum*, burnt yellow—*Peroxide of tin*, yellow, (gelatinous)—*Uranium*, reddish brown. †‡† RED PRUSSIATE OF POTASH (*ferridcyanide of potassium*) is distinguished by precipitating solutions of *bismuth*, (pale,) *cadmium*, *peroxide of mercury*, and *zinc*, (deep,) of a yellow color—*Protoxide of mercury*—*Cobalt*, (dark)—*Protoxide of copper, molybdenum, silver*, and *uranium*, reddish brown—*Peroxide of copper*, greenish yellow—*Protoxide of iron*, blue—*Manganese*, brown—*Nickel*, yellowish and green—and *protoxide of tin*, white. It does not affect solutions of peroxide of iron.

PRUSSIC ACID. HYDROCYANIC ACID. ACIDUM HYDROCYANICUM. *Prep.* I. ANHYDROUS. *a.* (Liebig.) Pure crystallized ferrocyanide of potassium 15 parts; water and sulphuric acid of each

parts; distil in a glass retort into a well-cooled receiver, containing chloride of calcium in coarse fragments, 5 parts; stop the process as soon as the chloride in the receiver is perfectly covered by the distilled fluid, and decant the acid into a bottle furnished with a good stopper. Keep it in the dark, with the bottle inverted. *b.* (Gay-Lussac.) Treat bicyanide of mercury with strong hydrochloric acid, and pass the vapor first over carbonate of lime, and then over chloride of calcium.

II. DILUTE. *a.* (*Acidum Hydrocyanicum dilutum.*) Sulphuric acid ℥iss; water f℥iv; mix in a glass retort, cool, add ferrocyanide of potassium ℥ij; dissolved in water ½ pint, and distil f℥vj into a well-cooled receiver, containing f℥viij of water; lastly, add f℥vj of water more, or as much as may be sufficient, so that a solution of 12·7 grs. of nitrate of silver may be accurately saturated by 100 grs. of the acid. Contains 2% of real acid. *b.* (Everitt.) Cyanide of silver 48½ grs.; distilled water f℥j; mix, add 39½ grs. of muriatic acid, agitate, and decant the clear into another vial. (P. L.) Contains 2% of pure acid. *c.* (P. D.) Bicyanide of mercury ℥j; muriatic acid fʒvij; water f℥viij; distil f℥viij. Sp. gr. 0·998. Contains 1·6% of pure acid. *d.* (Laming.) Cyanide of potassium 22 grs.; water fʒvj; dissolve, add crystallized tartaric acid 50 grs., dissolved in rectified spirit fʒiij; shake well together, and decant the clear: fʒj contains 1 gr. of pure acid. *e.* (P. E.) Similar to the P. L., but contains 3·23% of pure acid. *f.* (Dr. Clark.) Tartaric acid 1 part; water 40 parts; dissolve, add 2⅓ parts of pure cyanide of potassium, agitate, and decant. Contains 3% of pure acid, and a little bitartrate of potash. *g.* (Majendie.) Pure anhydrous acid f℥j; water f℥vj, (or 1 to 8½ by weight.) Contains 12% of pure acid, or 6 times as strong as that of the P. L. *h.* (Winckler.) Powdered crystals of prussiate of potash (pure) 120 grs.; solution of pure phosphoric acid (sp. gr. 1·25) 240 grs.; alcohol of 80%, 480 grs.; mix in a retort connected with a receiver containing 120 grs. of rectified spirit of wine, infuse for 24 hours, with occasional agitation, and then distil, adding to the distilled liquid sufficient alcohol to make it up to exactly 1½ oz Contains 2% of pure acid. *i.* (Dr. R. D. Thomson.) Dilute sulphuric acid (P. L.) fʒij; distilled water fʒvj; mix, cool, add pure cyanide of lead 43·36 grs.; agitate well, and decant the clear. Contains 2% of pure acid. *k.* (Scheele.) Prussian blue (pure) ℥ij; red oxide of mercury ℥vj; distilled water f℥vj; boil till the blue turns green, wash the sediment with hot water f℥x; pour the liquid upon clean iron filings ʒiij; add oil of vitriol ʒj; pour the liquid from the quicksilver that has separated, and distil ⅙th. The strength of the product varies. An acid of 4% is usually sold under this name; but the acid prepared as above is generally much stronger.

Remarks. Pure anhydrous prussic acid is a most deadly poison; 1 or 2 drops, either swallowed or applied to the skin, being sufficient to cause speedy death: even its vapor has a like effect. Dilute prussic acid has been taken with apparent advantage in chronic coughs, phthisis, and some other diseases. The dose of the acid (P. L.) may be from 2 to 5 minims 3 or 4 times a day, made into a mixture with water flavored with gum or sirup. It is also used externally in some skin diseases.

*** Prussic acid, even when dilute, is very liable to spontaneous decomposition, and this speedily occurs when it is exposed to the light. To promote its preservation, it is usual to surround the bottles containing it with thick purple paper, and to keep them inverted in an obscure situation. The addition of a *very small* quantity of muriatic acid renders it much less liable to change, and is generally made by manufacturers for that purpose. But in testing the strength of such acid by nitrate of silver, it is necessary to deduct the weight of the chloride of silver from that of the mixed precipitate. The cyanide of silver is soluble in a concentrated solution of nitrate of silver, and also in boiling nitric acid; but the chloride is insoluble in either of those menstrua. For estimating the strength of the commercial acid the following plan, proposed by Dr. Ure, will be found very exact and convenient, and may be used as a check to the above:—To 100 grains, or any other convenient quantity of the acid contained in a small vial, add in succession, small quantities of the peroxide of mercury in fine powder, till it ceases to be dissolved on agitation. The weight of the red precipitate taken up being divided by four, gives a quotient representing the quantity of real prussic acid present. By weighing out beforehand, on a piece of paper or a watch-glass, 40 or 50 grains of the peroxide, the residual weight of it shows at once the quantity expended. The operation may be always completed in five minutes, for the red precipitate dissolves as rapidly in the dilute prussic acid, with the aid of slight agitation, as sugar dissolves in water. Should the presence of muriatic acid be suspected, then the difference in the volatility of prussiate and muriate of ammonia may be had recourse to with advantage; the former exhaling at a very gentle heat, the latter requiring a subliming temperature of about 300° F. After adding ammonia in slight excess to the prussic acid, if we evaporate to dryness at a heat of 212°, we may infer from the residuary sal ammoniac the quantity of muriatic acid present.

Tests.—1. It is distinguished by a strong odor of bitter almonds.—2. Neutralized by potash, and tested with a solution of sulphate or tincture of iron, it gives a blue precipitate, or one turning blue on the addition of dilute sulphuric or muriatic acid.—3. Nitrate of silver gives a white precipitate, soluble in boiling nitric acid.—4. Supersaturated with potash, it gives a greenish blue precipitate with sulphate of copper, which is turned white by the cautious addition of muriatic acid.—5. Tincture of guaiacum gives a white precipitate, and when a few drops of solution of sulphate of copper are added, a blue color is produced, which is heightened by adding alcohol. (Pagenstecher.)—6. In cases of poisoning, if the above tests cannot be applied, the contents of the stomach may be introduced along with a little sulphuric acid into a retort, and distilled, and the reagents applied to the distilled liquor.

Ant.—1. Chlorine water, or solution of chloride of lime or soda, in doses of 2 or 3 spoonfuls diluted with water, frequently; also apply it externally.—2

Small quantities of ammonia water diluted with 10 or 12 parts of water; also the fumes inhaled.—3. The joint administration of carbonate of potash and sulphate of iron. This has been lately very strongly recommended. *** Cold affusion should be adopted in all cases, and is almost of itself a certain cure, if employed before the convulsive stage is over; and it is often successful even during the stage of insensibility and paralysis. (Herbst.) Artificial respiration should also be attempted. Unfortunately the poisonous action of prussic acid is so rapid that life is usually extinct before antidotes can be applied.

PUFF PASTE. Take a quarter of a peck of flour, and rub into it a pound of butter very fine. Make it up into a light paste with cold water, just stiff enough to work well. Next lay it out about as thick as a crown-piece; put a layer of butter all over, then sprinkle on a little flour, double it up, and roll it out again. Double and roll it with layers of butter three times or more, and it will be fit for use. By repeating this process 10 or 12 times, a very light paste will be formed. Bake in a moderately quick oven.

PULVERIZATION OF SALTS. Many salts which are pulverized with difficulty, and do not dissolve in spirit of wine, are easily transformed into a fine powder, by agitating their concentrated aqueous solution with a considerable quantity of spirit of wine; the disengaged fine crystallized powder may then be dried, and further divided by trituration. (Du Menil.) A large number of salts may also be reduced to coarse powder by keeping their solutions in a state of constant agitation during the evaporation.

PUNCH. *Prep.*—1. Juice of 3 or 4 lemons; yellow peel of 1 or 2 lemons; lump sugar ¾ lb.; boiling water 3½ pints; infuse ½ an hour, strain, add porter ½ pint; rum and brandy, of each ¾ to 1 pint, (or either alone 1½ to 2 pints,) and add more warm water and sugar, if desired weaker or sweeter.—2. (*Cold Punch.*) Arrack, port wine, and water, of each 1 pint; juice of 4 lemons; white sugar 1 lb.; mix.—3. (*Gin Punch.*) Yellow peel and juice of 1 lemon; gin ¾ pint; water 1¾ pints; sherry 1 glass; mix.—(*Iced Punch.*) Champagne or Rhenish wine 1 quart; arrack 1 pint; juice and yellow peels of 6 lemons; white sugar 1 lb.; soda water 1 or 2 bottles; ice as cream.—4. (*Milk Punch or Verder.*) Yellow rinds of 2 dozen lemons; steep for 2 days in rum or brandy 2 quarts; then add spirit 3 quarts more; hot water 3 quarts; lemon juice 1 quart; loaf sugar 4 lbs.; 2 nutmegs, grated; boiling milk 2 quarts; mix, and in 2 hours strain through a jelly bag.—5. (*Norfolk Punch.*) French brandy 20 quarts; yellow peels of 30 oranges and 30 lemons; infuse for 12 hours; add 30 quarts of cold water, 15 lbs. of lump sugar, and the juice of the oranges and lemons; mix well, strain through a hair-sieve, add new milk 2 quarts, and in 6 weeks bottle. Keeps well.—6. (*Orange Punch.*) As No. 1, using oranges, and adding a little orange wine. A little Curaçoa, Noyeau, or Mareschino, improves it.—7. (*Raspberry Punch.*) As last, but using raspberry juice or vinegar for oranges or lemons.—8. (*Regent's Punch.*) Strong hot green tea, lemon juice, and capillaire, of each 1½ pints; rum, brandy, arrack, and Curaçoa, of each 1 pint; Champagne 1 bottle; mix, and slice a pine-apple into it.—9. (*Tea Punch.*) Hot tea 1 quart; arrack ½ bottle; white sugar 6 oz.; juice of 8 lemons; yellow rinds of 4 lemons; mix.—10. (*Wine Punch.*) Sugar 1 lb.; yellow peel of 3 lemons; juice of 9 lemons; arrack 1 pint; port or sherry wine (hot) 1 gallon; cinnamon ½ oz.; nutmeg 1 dr.; mix. *** All the above are pleasant intoxicating beverages. (See SHRUB.)

PURL. *Prep.* To warm ale or beer add bitters 1 wine-glassful, or q. s. Some add spirit.

PURPLE OF CASSIUS. *Syn.* PURPLE PRECIPITATE. CASSIUS' DO. GOLD PURPLE. POURPRE DE CASSIUS, (*Fr.*) GOLD-PURPUR, (*Ger.*) AURUM STANNO PARATUM, (P. Cod.) PURPURA MINERALIS CASSII. *Prep.* I. Crystallized protochloride of tin 1 part; crystallized perchloride of tin 2 parts; dissolve each separately, mix, and add it to a solution of crystallized terchloride of gold 1 part; wash, and dry the precipitate. Very fine.

II. (Frick.) Dissolve tin in cold dilute aqua regia, till the fluid becomes faintly opalescent, then take the metal out and weigh it; dilute largely with water, and add simultaneously a dilute solution of gold and dilute sulphuric acid, in such proportion, that the tin in the one shall be to the gold in the other, in the ratio of 10 to 36.

III. Silver 150 parts; gold 20 parts; tin 35·1 parts; fuse together under charcoal and borax, cool, laminate, and dissolve out the silver with nitric acid. *Used* as a purple in porcelain painting, and to communicate a ruby red color to glass, when melted in *open* vessels.

PURPURINE. A coloring principle found by Robiquet and Colin in madder. It dissolves in alcohol, ether, and water, and solutions of alum and alkalis. It is also called *madder purple.*

PUTREFACTION. *Syn.* PUTREFACTIO. (*Lat.*, from *putrefacio*, I make rotten.) The spontaneous decomposition of animal and azotized vegetable substances, under the joint influence of warmth, air, and moisture. The solid and fluid matters are resolved into gaseous compounds and vapors, which escape, and earthy matters which remain. The most striking characteristic of this species of fermentation or decay, is, the ammoniacal or fetid exhalations that accompany it. We have already noticed some of the most useful antiseptic processes, (see p. 62,) and shall therefore merely observe here, that putrefaction may be prevented by the abstraction or exclusion of any of the conditions essential to its occurrence. This may be effected by—*reduction of temperature,*—*exclusion of atmospheric air,* or—*the abstraction of moisture.* Frozen meat may be preserved for an unlimited period, while the same substance will scarcely keep for more than a few days at the ordinary heat of summer. Animal substances will also remain uninjured for a long period if kept in vessels from which the air is entirely excluded, as in the process which is described below. The third condition is fulfilled when azotized matter is preserved in alcohol or in any similar fluid, or is dried. In either case water is abstracted from the surface, which then loses its propensity to putrefy, and forms an impervious layer, which excludes atmospheric oxygen from the interior and softer portion of the substance. Creosote, alcohol, the acids, and

ome of the salts, act in the latter way. One of he commonest methods of effecting this purpose, s to immerse the substance in alcohol of 60 to 70$\frac{0}{0}$, o which some camphor, ammonia, or common alt may be added; but a cheaper and equally fficient plan, is to employ a weak spirit holding a ittle creosote in solution; a solution of sulphurous cid may be substituted for alcohol. Meat immersed for 1 hour in water holding $\frac{1}{100}$th part of reosote in solution, may be preserved unchanged, ven during summer. In *Messrs. Donkin and Gamble's patent process*, the substances, previously parboiled, are placed in small tin cylinders, which are then filled up with rich soup; the lids re next soldered on quite air-tight, and a small ole afterwards made in the centre; the cylinders re then placed in a bath of brine, and heated to he boiling point, to complete the cooking process, when the hole in the lid is hermetically sealed, by oldering while the vessel still remains boiling hot. The ends of the tins on cooling assume a concave rm from the pressure of the atmosphere, without which they cannot be air-tight. The patentees xpose the canisters prepared as above for at least month to a heat of 100 to 110°, when if the process has failed, putrefaction commences, and the nds, instead of remaining *concave*, bulge and become *convex*. This is called the "TEST." This rocess was invented by M. Appert in France. Fish, flesh, and poultry may be thus preserved for ears in any climate. (See FERMENTATION, ANIMAL SUBSTANCES, ANATOMICAL PREPARATIONS, &c.)

PUTTY, GLAZIER'S. Whiting worked up with drying oil.

PUTTY, POLISHER'S. *Syn.* POTEE D'ETAIN. CALCINE. CINERES STANNI. *Prep.*—1. Melt tin, ake off the dross as it is formed, and calcine this ross till it becomes whitish.—2. Melt tin 1 oz. with an equal weight, or 1½ oz. of lead, and then aise the heat so as to render the mixed metal red ot, when the tin will be immediately flung out in he state of putty. Both are very hard, used for olishing glass and japan work, and to color opaque white enamel.

PUZZOLANA. A volcanic ash found at Pompeii, Vesuvius, &c. Mixed with lime it forms an xcellent hydraulic cement. A good artificial puzzolene may be made by heating a mixture of 3 ushels of clay and 1 bushel of slaked lime, for ome hours, to redness. (M. Bruyere.)

PYRETHRIN. An acrid resinous principle xtracted by alcohol and ether from the bark and ot of pellitory of Spain, (*anthemis pyrethrum*.) is also soluble in acetic acid.

PYROACIDS. (From πυρ, *fire*.) This term applied to several acids that are obtained by the ction of heat on other acids.—PYROCITRIC ACID, *Citricic do. Itaconic do.*)—PYROGALLIC DO.—PYROLITHIC DO.—PYROMALIC DO.—PYROMECONIC DO. PYROMUCIC DO.—PYROPHOSPHORIC DO., (formed y exposing a concentrated solution of phosphoric cid for some time to a heat of 415°.)—PYROTARTARIC and PYRUVIC DO., (obtained together from rtaric acid,) are examples of the pyroacids. The lts of the pyroacids are also distinguished by the efix *pyro*.

PYRODIGITALINA. A semi-solid, poisonous empyreumatic oil, obtained by Dr. Morries by e destructive distillation of the dried leaves of foxglove. *Pyroconia* is obtained in the same way.

PYROLIGNEOUS ACID. *Syn.* VINEGAR OF WOOD. SPIRIT OF DO. SMOKING LIQUOR. ESSENCE OF SMOKE. ACIDUM PYROLIGNOSUM. (From πυρ, *fire*, and *lignum*, wood.) Impure acetic acid obtained by the destructive distillation of wood in close vessels. It comes over along with tar and gaseous matter. In this state it is very impure, and contains much empyreumatic matter in solution; but by separation from the tar, saturation with slaked lime or chalk, defecation, and evaporation, an impure acetate of lime is obtained, which, after being gently heated, to destroy part of its empyreumatic matter without injuring its acetic acid, is again dissolved and defecated, and then precipitated by a solution of sulphate of soda, when a solution of acetate of soda and a precipitate of sulphate of lime are formed by double decomposition. The solution is next evaporated to dryness, the dry mass dissolved in water, and the new solution filtered and recrystallized. The crystals of acetate of soda obtained by the last process yield pure acetic acid by distillation along with sulphuric acid. (See ACETIC ACID and ANIMAL SUBSTANCES.)

PYROPHORUS. (From πυρ, *fire*, and φερω, *I bear*.) *Syn.* LUFT-ZUNDER, (*Ger.*) A substance that inflames spontaneously when exposed to the air. *Prep.*—1. (Homberg's.) Alum and brown sugar, equal parts; stir the mixture in an iron ladle over the fire till dry, then put it into an earthen or coated glass vial, and keep it at a red heat so long as flame is emitted; it must then be carefully stopped up and cooled.—2. (Dr. Hare.) Lampblack 3 parts; burnt alum 4 parts; carbonate of potash 8 parts; as above.—3. (Gay Lussac.) Sulphate of potash 9 parts; calcined lampblack 5 parts; as last.—4. (Göbel.) Heat tartrate of lead red hot in a glass tube, and then hermetically seal it.—5. Alum 3 parts; wheat flour 1 part; as No 1. *** When the above are properly prepared, a little of the powder becomes glowing hot and inflames on exposure to the air. The accession of the combustion is promoted by moisture, as a damp atmosphere or the breath. They all (except the fourth) owe their combustibility to the presence of sulphuret of potassium. (Gay Lussac.)

PYROTECHNY. (From πυρ, *fire*, and τεχνη, *art*.) The art of making fireworks. "The three prime materials of this art are, *nitre*, *sulphur*, and *charcoal*, along with filings of iron, steel, copper, zinc, resin, camphor, lycopodium, &c. GUNPOWDER is used either in *grain*, *half-crushed*, or *finely ground*, for different purposes. The longer the *iron filings*, the brighter red and white spots they give; those being preferred which are made with a coarse file, and quite free from rust. *Steel filings* and *cast-iron borings* contain carbon, and afford a more brilliant fire, with wavy radiations. *Copper filings* give a *greenish* tint to flame; those of *zinc*, a fine *blue color;* the *sulphuret of antimony* gives a less greenish blue than zinc, but with much smoke; *amber* affords a *yellow fire*, as well as *colophony*, (rosin,) and *common salt;* but the last must be very dry. *Lampblack* produces a very *red color* with gunpowder, and a *pink one* with nitre in excess; it serves for making golden showers." When lightly mixed with gunpowder

and put into cases, it throws out small stars resembling the rowel of a spur; this composition has hence been called "spur fire." "The *yellow sand*, or *glistening mica*, communicates to fireworks *golden radiations*. *Verdigris* imparts a *pale green; sulphate of copper* and *sal ammoniac* give a *palm-tree green*. *Camphor* yields a very *white flame* and aromatic fumes, which masks the bad smell of other substances. *Benzoin* and *storax* are used also on account of their agreeable odor. *Lycopodium* burns with a *rose color* and a magnificent flame; but it is principally employed in theatres to represent lightning, or to charge the torch of a fury." (Dict. of Arts, Manuf., and Mines.)—Our space will only permit a brief notice of the process of making gunpowder, and the composition for rockets and colored fires.

GUNPOWDER is composed of saltpetre, charcoal, and sulphur. (See page 347.) The *saltpetre* having been trebly refined, is melted into cakes, which are then brushed to remove any adhering grit or dirt, broken into pieces with a mallet, ground to a fine powder in a mill, and sifted through a fine bolting sieve of brass wire. The *charcoal* is that of the dogwood, alder, or willow, and is carefully burnt, as described at p. 177, and is then reduced to powder as above. The *sulphur* is refined and ground to the same fineness as the charcoal and saltpetre. The ingredients are then weighed out in the proper proportions, and mixed by placing them gradually in a wooden vessel, in alternate and equal layers, after which the whole is thoroughly and perfectly mixed together. The mixture is then sifted, and carefully ground to a paste with water, and pressed into a hard cake, which is next broken into pieces, granulated by agitation in parchment sieves, and after being glazed by friction, and the dust separated, is dried with proper precaution in a stove heated to about 100°.

COLORED FIRES. I. (*Blue.*) *Prep.*—1. Saltpetre 5 parts; sulphur 2 parts; metallic antimony 1 part; mix.—2. (Ruggieri.) Gunpowder 4 parts; sulphur and zinc, of each 3 parts; saltpetre 2 parts.—3. Nitrate of baryta 77 parts; sulphur 13 parts; chlorate of potash 5 parts; charcoal 3 parts; realgar 2 parts; mix.—4. (Marsh.) Chlorate of potash 69 grs.; sulphur 24 grs.; sulphate of copper 7 grs.—5. (Bird.) Black sulphuret of antimony ℥iv; nitre ℥xij; sulphur ℥xvj; charcoal and orpiment, of each ʒij.

II. (*Crimson.*) *Prep.* (Marsh.)—*a.* Chlorate of potash 4¼ parts; nitrate of strontia 67½ do.; charcoal (alder or willow) 5¾ do.; sulphur 22½ do.; mix, lightly press it into teacups or small pots, and prime with a quick-match.—*b.* Chlorate of potash 17¼ parts; sulphur 18 parts; nitrate of strontia 55 parts; charcoal 4¼ parts; sulphuret of antimony 5½ parts; mix, load pill-boxes with it, and prime with a quick-match. For stars.

III. (*Green.*) *Prep.*—1. Nitrate of baryta and charcoal, equal parts. Used in ghost scenes.—2. Sulphur 13 parts; nitrate of baryta 77 do.; chlorate of potash 5 do.; charcoal 3 do.; metallic arsenic 2 do. Very beautiful. It shows best when burnt before a reflector.—3. (A. Bird.) Nitrate of baryta ℥xx; sulphur ℥iss; black sulphuret of antimony ℥ss; chlorate of potash ℥j ʒij; charcoal ʒij to ʒiv.—4. (Marsh.) Nitrate of baryta 62½ parts; sulphur 10½ do. chlorate of potash 23¾ do.; charcoal and sulphuret of arsenic, of each 1½ do. Put it into small pill-boxes for stars.

IV. (*Lilac.*) *Prep.* (Marsh.)—*a.* Chlorate of potash 49 parts; sulphur 25 do.; dry chalk 20 do.; black oxide of copper 6 do. For pans.—*b.* Chlorate of potash 50 parts; sulphur 25 do.; dried chalk 22 do.; black oxide of copper 3 do. For stars.

V. (*Purple.*) *Prep.*—1. Lampblack, realgar, and nitre, of each 1 part; sulphur 2 parts; chlorate of potash 5 do.; fused nitrate of strontia 16 parts; mix.—2. (Marsh.) *a.* Chlorate of potash 42 parts; nitrate of potash and sublimed sulphur, of each 22¾ do.; black oxide of copper 10 do.; sulphuret of mercury 2¾ do. For pans.—*b.* Chlorate of potash 77½ parts; sulphur 13 do.; sulphate of copper 9¾ do. For stars.

VI. (*Red.*) *Prep.*—1. (Ruggieri.) Fused nitrate of strontia 40 parts; sulphur 13 do.; chlorate of potash 5 do.; sulphuret of antimony 4 do. A little charcoal or lampblack will make it burn quicker.—2. (Marsh.) Dried nitrate of strontia 72 parts; sulphur 20 do.; gunpowder 6 do.; coal dust 2 do—3. (Bird.) Dried nitrate of strontia ℥xx; sulphur ℥viss; chlorate of potash ℥iiss; black sulphuret of antimony ʒij; charcoal ℥ss.—4. Sulphur, sulphuret of antimony, and nitre, of each 1 oz.; dried nitrate of strontia 5 oz.

VII. (*Yellow.*) *Prep.* (Marsh.) Nitrate of soda (pure and dry) 74½ parts; sulphur 19½ do.; charcoal 6 do. For pans.

VIII. (*White.*) *Prep.*—1. (Ruggieri.)—*a.* Nitre 48 parts; sulphur 13¼ do.; sulphuret of antimony 17¼ do.—*b.* Nitre 24 parts; sulphur 7 do.; realgar 2 do.—*c.* Nitre 75 parts; sulphur 24 do.; charcoal 1 do.—*d.* Gunpowder 100 parts; iron or zinc borings 25 do.—2. (Bird.) Black antimony ℥iv; nitre ℥xij; sulphur ℥xvj; white arsenic ʒij; charcoal ʒij; or more.—3. (Marsh.)—*a.* Saltpetre 46½ parts; sulphur 23 do.; gunpowder 12¼ do.; zinc filings 18 do. For pans.—*b.* Saltpetre 57 parts; sulphur 28 do.; zinc filings 15 do. For stars.

Remarks. In preparing colored fires, the ingredients should be separately reduced to fine powder, and sifted through lawn; and should be kept in well-corked wide-mouthed bottles till the time of mixing them, when the requisite quantity of each should be weighed out, and thoroughly but carefully mixed, with a bone or wooden knife, on a sheet of clean white paper. The mixed ingredients are then lightly packed in small cups or pans for illuminations, or into small pill-boxes for stars; in either case affixing a piece of quick-match.

*** The process should be conducted with great care to prevent explosion. They sometimes inflame spontaneously by keeping. Colored fires should not be kept long before being used. (See CHLORATE OF POTASH.)

ROCKETS. The cases are made of stout cartridge paper rolled on a mould and pasted, and then throttled a little below the mouth, like the neck of a vial. The (external?) diameter of a rocket should be exactly equal to that of a leaden ball of the same weight, and the length should be equal to 3½ times the internal diameter. (Marsh.) They are filled with the following mixtures tightly driven in, and then "garnished," and affixed to willow rods to direct their flight.—I. (Marsh.)—*a.* (*For 2 oz.*

rockets.) Nitre 54½ parts; sulphur 18 do.; charcoal 27¼ do.; all in fine powder, and passed through lawn.—*b.* (*For 4 oz. do.*) Nitre 64 parts; sulphur 16 do.; charcoal 20 do.; as last.—*c.* (*For ½ lb. to 1 lb. do.*) Nitre 62¾ parts; sulphur 15¾ do.; charcoal 21½ do.; as last.—II. (Ruggieri.) *a.* For rockets of ¾ inch diameter use nitre 16 parts; charcoal 7 do.; sulphur 4 do.—*b.* For ¾ to 1½ inch, use 1 part more nitre.—*c.* For 1¾ inch, use 2 parts more nitre.—*d.* By using 1 part less charcoal, and adding respectively 3, 4, and 5 parts of fine steel filings, the above are converted into *brilliant fires.*—*e.** By the substitution of coarse cast-iron borings for filings, and a further omission of 2 parts of charcoal from each, the latter are converted into Chinese fire.—*Hand or ground rockets* are usually loaded with nothing but meal gunpowder and filings or borings. After sky-rockets are charged, a piece of clay is driven in, through which a hole is pierced, and the *head* or *garniture* filled with stars, and a little cornpowder is then applied.

STARS FOR ROCKETS. 1. *Brilliant.* (Marsh.) Nitre 52½ parts; sulphur and black antimony, of each 13 parts; powder, mix, and make a stiff paste with isinglass 1½ parts, dissolved in vinegar 1½ parts, spirits of wine 13 parts; form into small pieces, and while moist roll them in meal gunpowder.—2. *White.* (Ruggieri.) Nitre 16 parts; sulphur 7 do.; gunpowder 4 do.; make a paste as last.—3. *Golden Rain. a.* (Ruggieri.) Nitre and gunpowder, of each 16 parts; sulphur 10 do.; charcoal 4 do.; lampblack 2 do.; mix and pack it into small paper tubes.—*b.* (Ruggieri.) Nitre 16 parts; sulphur and gunpowder, of each 8 do.; charcoal and lampblack, of each 2 do.; as last.—*c.* (Marsh.) Mealed gunpowder 66¾ parts; sulphur 11 do.; charcoal 22¼ do.; as last.

PYROTHONIDE. (From πυρ, *fire*, and ὀθόνη, *linen.*) A popular remedy for the tooth-ache and skin diseases, obtained by distilling rags, (*rag oil,*) or by burning a small cone of paper on a cold plate, (*paper oil.*)

PYROXILENE. *Syn.* PYROXANTHINE. EBLANIN. An orange red crystalline substance obtained by Scanlan from raw pyroxilic spirit by adding potash water, pressing the precipitate, washing with cold alcohol of sp. gr. 0·840, and crystallizing from boiling alcohol. With oil of vitriol it gives a rich crimson, and with muriatic acid a deep purple.

QUASS. *Syn.* POSCA. *Prep.* Mix rye flour and warm water together, and keep it by the fireside till it has turned sour. *Used* as vinegar in Russia.

QUASSIA, ROASTED. *Used* when reduced to powder, to embitter beer and give it color, but the liquor soon grows turbid.

QUASSIINE. A white crystalline substance, intensely bitter, extracted by alcohol from quassia wood, (quassia amara.)

QUEEN'S METAL. A species of pewter used to make teapots, &c., made by fusing under charcoal a mixture of tin 9 parts; antimony, bismuth, and lead, of each, 1 part; or tin 100 parts; antimony 8 do.; copper 4 do.; bismuth 1 do.

QUERCITRINE. The yellow coloring principle of quercitron bark. It is crystallizable.

QUILLS. *Prep.* Suspend the quills in a copper, over water sufficiently high to touch the nibs; then close it steam-tight, and apply four hours hard boiling; next withdraw and dry them, and in 24 hours cut the nibs and draw out the pith; lastly, rub them with a piece of cloth and expose them to a moderate heat in an oven or stove The quills prepared in this way are as hard as bone, without being brittle, and as transparent as glass.

QUININE. *Syn.* CHININE. QUINA. QUININA. QUINIA. QUININUM. A white, odorless, bitter, fusible and crystallizable alkaloid, discovered by Pelletier and Caventou in cinchona bark. It is most readily obtained by precipitating a solution of the sulphate or disulphate by ammonia, and washing and drying the precipitate. By solution in alcohol sp. gr. 0·815, and spontaneous evaporation, it may be procured in crystals. Crystals may also be obtained from its solution in hot water with a little ammonia, (Liebig.) Quinine is not used in medicine, but several of its salts are largely employed on account of their tonic and febrifuge powers. They may all be made by saturating the dilute acids with the base, evaporating and crystallizing.

QUININE, FERRO-CITRATE OF. *Syn.* QUINÆ FERRO-CITRAS. *Prep.* To a solution of pure citrate of peroxide of iron add as much pure quinine as it will dissolve; filter, evaporate, and spread it on hot plates, as directed under Ammonio-Citrate of Iron.

QUININE, FERRO-SULPHATE. *Syn* QUINÆ FERRO-SULPHAS. From a mixed solution of the sulphates of iron and quinine in atomic proportions; as last.

QUININE, SULPHATE OF. *Syn.* SUBSULPHATE OF DO. DISULPHATE OF DO. QUINÆ SULPHAS. QUINÆ DISULPHAS, (P. L.) *Prep.* I. (P. L.) Heartleaved (yellow) cinchona bark, bruised, lb. vij; sulphuric acid ℥iv ʒij; diluted with water 6 gallons; boil 1 hour and strain; repeat the boiling a second time for 1 hour, with a like quantity of acid and water, and again strain; next boil the bark in water 8 gallons, and strain; to the mixed liquors, add moist hydrated oxide of lead nearly to saturation, decant the supernatant fluid, and wash the sediment with distilled water; boil down the liquor for 15 minutes and strain, then precipitate the quina by solution of ammonia, and wash the precipitate (with cold water) until nothing alkaline is perceptible; saturate what remains with sulphuric acid ℥ss diluted with water, digest with animal charcoal ℥ij, and strain; lastly, the charcoal being well washed, evaporate the mixed liquors that crystals may form.

II. (P. E.) This process varies from the former in first boiling the bark (lb. j) in water, (4 pints,) along with carbonate of soda, (℥iv,) pressing, and moistening the residuum with fresh water and pressing it a second and a third time, for the purpose of removing the acids, coloring matter, gum, and extractive, before proceeding to extract the alkaloid. Lime (Stolze) and caustic potash (Badollier and Scharlau) have been proposed for the same purpose. An excellent process

III. (*Wholesale.*) Boil coarsely-powdered calisaya, or yellow bark, in water acidulated with sulphuric or muriatic acid, strain with pressure,

and repeat the process with fresh water, a second, third, and fourth time; filter the mixed liquors, and when cold, add finely-powdered slaked lime or milk of lime till the fluid becomes distinctly alkaline and acquires a dark color; collect the precipitate, drain on a linen filter, and then submit the mass to a powerful hydraulic press; dry the cake, powder, and digest in rectified spirit; filter, distil off the spirit till the liquor acquires the consistence of sirup or honey, carefully saturate with very dilute sulphuric acid, filter, and set it aside to crystallize; drain the crystals on a linen filter, submit them to pressure, dissolve in boiling water, decolor with animal charcoal, recrystallize, and dry the resulting salt. In some laboratories, the sulphuric acid is added before distilling off the spirit.

Remarks. The use of spirit of wine does not increase the expense above ½ to 1*d.* per oz., which is more than counterbalanced by the saving of time and the superiority of the product. Disulphate of quinine is extensively employed as a stomachic in doses of ½ to 1 gr.; as a tonic 1 to 3 grs.; and as a febrifuge 2 to 20 grs. When pure it forms light, delicate, white needles. "It is entirely soluble in water, (hot,) and more readily so when an acid is present. Precipitated by ammonia, the residuary liquid after evaporation should not taste of sugar. By a gentle heat it loses 8 or 10% of water. It is wholly consumed by heat. If chlorine be first added, and then ammonia, it becomes green." (P. L.) "A solution of 10 grs. in f℥j of distilled water, and 2 or 3 drops of sulphuric acid, if decomposed by a solution of ℥ss of carbonate of soda, in two waters, and heated till the precipitate shrinks and fuses, yields on cooling a solid mass, which, when dry, weighs 7·4 grs., and in powder, dissolves entirely in a solution of oxalic acid." (P E.) It is often adulterated with starch, magnesia, gum, sugar, cinchonine, &c. The first three remain undissolved when the salt is digested in spirit; the *fourth* is dissolved out by cold water, and the *last* may be detected by precipitating the quinine by liquor of potassa, and dissolving the precipitate in boiling alcohol; cinchona crystallizes out as the solution cools, but the quinine remains in the mother liquor. (Pereira.) *** The *Neutral Sulphate of Quinine* is formed by dissolving disulphate of quinine ℥j, in water acidulated with sulphuric acid f℈ss, and crystallizing.

QUINOMETRY. The art of estimating the quantity of quinine in cinchona bark.

Proc. (P. E.) "A filtered decoction of 100 grs. in f℥ij of distilled water, gives with f℥j of a concentrated solution of carbonate of soda, a precipitate, which when heated in the fluid, becomes a fused mass, weighing, when cold, 2 grs. or more, and is easily soluble in solution of oxalic acid." Quinine may be separated from cinchonine by digestion in ether. (Scharlau.)

QUINOVINE. *Syn.* Cinchovine. An alkaloid obtained from the bark of quina ovata by a like process to that by which quinine is obtained from yellow bark.

QUINTESSENCE. A term used by the alchemists synonymously with essence.

RACEMIC ACID. *Syn.* Paratartaric Acid. An acid found in the juice of the grape, replacing tartaric acid. It is distinguished from tartaric acid by being less soluble in water, and by not giving indications of electricity when one of its crystals, held by a pair of platinum tongs, and gently heated in the flame of a spirit lamp, is brought into contact with the plate of an electroscope, whereas a crystal of tartaric acid causes electrical excitement. (Boettger's Beiträge.) By the action of heat it yields *paratartralic, paratartrelic,* and *anhydrous racemic acids.* It is principally found in the grape juice of the district of the Vosges. Racemic and tartaric acids are isomeric compounds.

RADCLIFFE'S ELIXIR. *Prep.* Socotrine aloes ℨvj; cinnamon, cochineal, and zedoary root, of each, ℈ss; rhubarb ℈j; sirup of buckthorn f℥ij; proof spirit 1 pint; water f℥v; digest a week. Aromatic, stomachic, and purgative. *Dose.* 1 to 4 dr.

RATAFIA. A liquor prepared by imparting to sweetened spirit the flavor of various kinds of fruit. The following are examples:—

1. (*Ratafia de Cassis.*) *Prep.*—*a.* Black currants, stoned and crushed, 3 lbs.; cloves 1 dr.; cinnamon 2 drs.; spirit at 18° B. 4 quarts; white sugar 2½ lbs.; digest in a corked bottle for a fortnight, occasionally shaking, then strain through a cloth and filter through paper.—*b.* Black currants 6 lbs.; cloves ½ dr.; cinnamon 1 dr.; proof spirit 2¼ gallons; sugar 4 lbs.; as last. A delicious liquor. 2. (*Curaçoa. Ratafia de Curaçoa.*) Spirit of 18° B. 5 quarts; yellow peels of 5 or 6 smooth Portugal oranges; infuse for 14 days, add white sugar 4 lbs., dissolved in pure water ½ a gallon; cinnamon and mace, of each, well bruised, 48 grs.; ground Brazil wood 1 oz.; infuse with frequent agitation for 10 days longer, bring up the color with burnt sugar, and filter. Very fine.—*b.* Proof spirit 1 gallon; Seville orange peel cut thin, dried, and coarsely powdered, or cut small, ¼ to ½ lb.; digest 14 days, press out the liquor, filter, and add an equal measure of simple sirup or capillaire, and coloring q. s. Stomachic. 3. (*Ratafia d'Angelique.*) Angelica seeds 1 dr.; do. stalks 4 oz.; blanched bitter almonds, bruised, ¾ to 1 oz.; proof spirit 6 quarts; white sugar 2 to 3 lbs.; digest for 10 days, and filter. 4. (*Ratafia d'Anis.*) Bruised aniseeds 2 oz.; proof spirits 2 quarts; sugar ¾ lb., dissolved in water 1 pint; as last. 5. (*Ratafia de Caffé.*) Coffee, ground and roasted, 1 lb.; proof spirit 1 gallon; sugar 1½ lbs., dissolved in water 1 quart; as last. 6. (*Ratafia de Cerises.*) Morello cherries, with their kernels bruised, 7 or 8 lbs.; proof spirit 1 gallon; sugar 1½ lbs.; as last. 7. (*Ratafia de Grenoble.*) Small wild black cherries, with their kernels bruised, 2 lbs.; proof spirit 1 gallon; white sugar 2½ lbs.; citron peel a few grains; as last. 8. (*Ratafia de Cacao. R. de Chocolat.*) Caracca cacao nuts 1 lb.; West Indian do. ½ lb.; both roasted and bruised; proof spirit 1 gallon; digest for 14 days, filter, and add white sugar 2½ lbs.; tincture of vanilla ½ dr.; or a shred of vanilla may be infused with the nuts in the spirit instead. 9. (*Ratafia de Coings.*) Quince juice 6 pints; bitter almonds 4 drs.; cinnamon 3 drs.; coriander seeds 2 drs.; mace ½ dr.; cloves 15 grs.; all bruised; rectified spirit 3 pints; digest for a week, filter, and add sugar 2½ to 3 lbs. 10.

Ratafia de framboises.)—*a.* Raspberries 8 lbs.; proof spirit 2 quarts; sugar 1 lb.; digest, press, and filter.—*b.* Raspberry juice and proof spirit, of each 2 quarts; sugar 3 lbs.; as last. 11. (*Ratafia de genièvre.*) Juniper berries (whole) 1 oz.; proof spirit 1 quart; sugar 5 oz.; digest. 12. (*Ratafia de Brou de noix.*) Young walnuts with soft shells 60 in no.; brandy 2 quarts; sugar ½ to 1 lb.; mace, cinnamon, and cloves, of each 15 grs.; digest for 8 weeks; press, filter, and keep for some months before use. Stomachic. 13. (*Ratafia de Noyeau.*)—*a.* Peach or apricot kernels, bruised, 120 in no.; proof spirit 2 quarts; white sugar ½ lb.; digest for a week, press and filter.—*b.* For proof spirit use juice of apricots or peaches 3½ pints; rectified spirit of wine 4½ do. 14. (*Ratafia de œillets.*) Clovepinks without the white buds, 4 lbs.; cinnamon and cloves, of each 15 grs.; proof spirit 1 gall.; white sugar 1 to 1½ lbs.; digest for 10 days, press and filter. 15. (*Ratafia à la Provençale.*) Striped pinks 1 lb.; proof spirit 1 quart; sugar 7 or 8 oz.; juice of strawberries ½ lb.; saffron 15 grs.; as last. 16. (*Ratafia d'écorces d'Oranges.*) Fresh yellow peel of Seville oranges 4 oz.; proof spirit 1 gallon; white sugar 1 lb.; digest for 6 hours. 17. (*Ratafia de fleurs d'oranges.*)—*a.* Fresh orange flowers 2 lbs.; proof spirit 1 gallon; sugar 1½ to 2 lbs.; as last.—*b.* Instead of orange flowers use neroli 1 dr. 18. (*Ratafia à la Violettes.*) Orris powder 1½ oz.; archil 4 oz.; rectified spirits of wine 2 gallons; digest for 10 days, strain, and add white sugar 9 lbs., dissolved in water 1 gallon. 19. (*Ratafia de baume de Tolu.*) Balsam of Tolu 1 oz.; rectified spirit 1 quart; dissolve, add water 3 pints; filter, and further add sugar 1½ lbs. Pectoral. 20. (*Red Ratafia.*) Juice of black cherries 3 quarts; do. strawberries and raspberries, of each 1 quart; cinnamon 1 dr.; mace and cloves, of each 15 grs.; proof spirit 2 gallons; sugar 6 lbs.; macerate. 21. (*Dry Ratafia.*) Juice of gooseberries 5 pints; do. of cherries, strawberries, and raspberries, of each 1 pint; proof spirit 6 quarts; sugar 6 lbs.; as last. 22. (*Cream Ratafia.*) Noyeau, sherry wine, capillaire, of each ½ pint; cream 1 pint; beat together. 23. (*Ratafia des quatre fruits.*) Cherries 30 lbs.; gooseberries 15 lbs.; raspberries 8 lbs.; black currants 7 lbs.; express the juice, and to each pint add white sugar 4 to 6 oz.; cinnamon 6 grs.; cloves and mace, of each 3 grs. *** The addition of a few drops of essence of ambergris, or a grain of ambergris infused in the spirit, imparts a delightful flavor and boquet which is much admired.

RATS AND MICE may be most easily and safely exterminated by mixing powdered nux vomica with oatmeal, and laying it in their haunts, observing to use the proper precautions to prevent accidents. White arsenic is also employed in a similar manner. Dr. Ure has recommended the use of oatmeal mixed with a little powdered phosphorus for this purpose.

RECTIFICATION. *Syn.* RECTIFICATIO, (*Lat.*) (From *rectus*, right, and *fio*, to be made.) A second distillation of a fluid for the purpose of rendering it purer.

RED DYES.—1. Give the goods a mordant of alum, rinse, dry, and boil them in a bath of madder. If acetate of iron be used instead of alum, the color will be purple, and by combining the two any intermediate shade may be produced.—2. (*Adrianople or Turkey red.*) This is given by many distinct operations. The first consists in cleansing or scouring the goods by alkaline baths, after which they are steeped in oily liquors brought to a creamy state by a little carbonate of soda solution. Infusion of sheep's dung is often used as an intermediate or secondary steep. The operation of oiling, with much manual labor, and then removing the superfluous or loosely-adhering oil with an alkaline bath, is repeated two or three times, taking care to dry hard after each process. Then follows the galling, aluming, maddering, and brightening, for removing the dun-colored principle, by boiling at an elevated temperature with alkaline liquids and soap. The whole is often concluded with a *rosing* by salt of tin.—3. The yarn or cloth is put into a very weak alkaline bath at the boiling temperature, then washed, dried, and galled; or, when the calico is to be printed, for this bath may be substituted one of cow-dung, subsequent exposure to the air for a day or two, and immersion in very dilute sulphuric acid. In this way the stuff gets opened, takes and retains the color better. After the galling, the goods are dried, and alumed twice; then dried, rinsed, and passed through the madder bath. This is composed of three-fourths of a pound of good madder for every pound weight of the goods. The bath is slowly raised to the boiling point in the course of fifty or sixty minutes, more or less, according to the shade of color wished for. When the boiling has continued a few minutes, the stuff is taken out, washed slightly, and dyed a second time in the same manner, and with as much madder. It is then washed and dried, or passed through a hot soap bath, which carries off the fawn-colored particles. Other dyes likewise are added to the madder bath, to obtain other shades of color; for instance, a decoction of fustic, weld, logwood, quercitron, or knoppern, the mordants being modified accordingly. When bran is added to the madder bath, the color becomes much lighter, and of a more agreeable tint. *** Red dyes are also given by archil, carthamus, cochineal, Brazil wood, &c.

RED LIQUOR. The crude acetate of alumina, used by dyers. (See ALUMINA.)

RED PIGMENTS. The principal of these are *brown red, Indian do., light do.*, (burnt light ochre—makes a flesh color with white-lead and oil,) *orange red*, (*sandix*—made by calcining white-lead,) *stone do., Venetian do., red ochre, chrome red, vermilion, red lake, &c.*

REGULUS, (dimin. of *rex*, a king.) A term applied by the alchemists to various metallic matters obtained by fusion; as *Regulus of antimony, arsenic, &c.* The former was often distinguished by the simple term *Regulus*. MARTIAL REGULUS OF ANTIMONY is sulphuret of antimony reduced by fusion with 1½ times its weight of old nails or iron filings, and some nitre and tartar. REGULUS JOVIS is made by melting a mixture of equal parts of martial regulus of antimony and tin. Both are cast into cups. Wine kept in them for a night becomes emetic.

RESINS. *Syn.* RESINES, (*Fr.*) HARZE, (*Ger.*) RESINÆ, (*Lat.*, from ῥέω, *I flow.*) Proximate vegetable principles, the ultimate composition of

which is carbon, hydrogen, and oxygen. They are distinguished by their solubility in alcohol, insolubility in water, fusing by a moderate heat, and not being volatile without decomposition. Their sp. gr. varies from 0·9 to 1·2. According to Liebig, they are oxidized essential oils. Common resin, and the shellac of which sealing-wax is made, are familiar examples of these substances.

RELISH, KITCHINER'S. *Prep.* Ground black pepper, and salt, of each 1 oz.; ground allspice, scraped horseradish, and minced shalotes, of each ½ oz.; walnut pickle, or mushroom ketchup, 1 pint; infuse 14 days, and strain. *Used* as a sauce, &c.

RENNET. *Syn.* CALVES' MAW. COAGULUM. The stomach of calves, washed, and preserved either in brine or dry salt. *Used* to curdle milk. Two square inches from the bottom are sufficient for a cheese of 60 lbs. (See CHEESE.)

RESINEONE. An oily liquid obtained along with *resinone* when resin and lime are distilled together. (Fremy.)

RHABARBERIN. *Syn.* RHEUMIN. RHEIN. RHABARBERIC ACID. RHEUMIC ACID. The yellow coloring principle of rhubarb. It is obtained by digesting powdered rhubarb in ether, distilling off greater part of the ether, and submitting the remainder to spontaneous evaporation. The crystals thus procured are purified by repeated solutions and crystallizations in alcohol. Orange yellow. Gripes, but does not purge. (Brandes.)

RHAMNINE. *Prep.* Express the juice from buckthorn berries scarcely ripe, boil the residue with water, strain, and press; crude rhamnine will be obtained as the liquid cools, which, by solution in boiling alcohol and filtration, may be procured in crystals.

RHAPONTICIN. A peculiar, yellow, oderless, tasteless, and crystallizable substance, obtained from the root of English rhubarb. It is extracted by boiling absolute alcohol.

RHEUMATISM. *Syn.* RHEUMATISMUS, (*Lat.*) ῥευματισμος, (*Gr.*, from ῥευματιζω, *to be afflicted with defluxions.*) A painful affection of the joints, attended by swelling and stiffness, and also attacking the muscular, tendinous, and fibrous textures. *Acute Rheumatism*, or rheumatic fever—*Arthritis*, inflammation of the synovial membrane, or rheumatic gout—*Sciatica*, or rheumatism of the cellular envelope of the great sciatic nerve, affecting the hip—and *Lumbago*, or rheumatism of the loins, are all varieties of the same disease. The treatment consists in the administration of purgatives and sudorifics, accompanied by a course of bark, quinine, or other tonics. Calomel and opium, and iodide of potassium, have also been largely and successfully administered in this complaint. When the inflammatory symptoms are severe, occasional venesection should be had recourse to. The compound powder of ipecacuanha taken at night will generally promote the ease and sleep of the patient, and, by its sudorific action, tend considerably to promote a cure. Where possible, a dry atmosphere and regular temperature should be sought. Stimulating embrocations, blisters, frictions, and the hot or vapor bath, are frequently very serviceable in rheumatism, especially in *lumbago*, and casual attacks arising from cold.

RHODIZONIC ACID. *Prep.* When dry carbonic acid gas is passed over fused potassium, a black porous mass is obtained, and this substance exposed to moist air, deliquesces into a solution of *rhodizonate of potassa* of a scarlet color, from which the excess of alkali may be taken by alcohol. By treatment with sulphuric acid and alcohol, the rhodizonic acid may be separated. When its solution is heated, it is converted into *croconic acid*. The latter acid is obtained by adding fluosilicic acid to a solution of croconate of potash, evaporating to dryness, and dissolving out the croconic acid with water. This acid, as well as its salts, is yellow, hence its name, (from *crocus*, saffron.)

RHODIUM, (from ῥοδον, *a rose*, because of the color of the solutions of its salts.) A whitish metal discovered by Wollaston in 1803, associated with palladium, in the ore of platinum. It is obtained from the nitromuriatic solution of platinum ore, previously saturated with soda, by precipitating the palladium by bicyanide of mercury, filtering, adding muriatic acid, evaporating to dryness, powdering, and digesting in alcohol of sp. gr. 0·837; the undissolved portion (*double chloride of rhodium and sodium*) is then washed with alcohol, and either exposed to a very strong heat, or gently heated in a stream of hydrogen gas, and afterwards well washed with water. Another method is to dissolve in water the portion left after the action of the alcohol, and to precipitate by a plate of zinc. In this state it is a black powder. This powder exposed to heat continues black; but with borax it acquires a white metallic lustre, though it remains infusible. Sulphur or arsenic, however, renders it fusible, and may afterwards be expelled by continuing the heat. The button is not malleable. OXIDE OF RHODIUM (*peroxide*) is prepared by heating pulverulent rhodium mixed with hydrate of potassa, and a little nitre, in a silver crucible, and well washing the resulting powder, first with water, then with muriatic acid, and again with water. A greenish gray powder. In this state it is insoluble in acids. An impure soluble oxide is precipitated when carbonate of potash, or soda, is added in excess to the double chloride of rhodium and potassium.—CHLORIDE OF RHODIUM (*perchloride*) is obtained by adding to a solution of the double chloride of rhodium and potassium, silico-hydrofluoric acid, as long as the double fluoride of potassium and silicon is generated, then filtering, evaporating, and redissolving in water. (Berzelius.) *** Pure rhodium is insoluble in acids, but dissolves in aqua regia when alloyed with other metals. Its sp. gr. is about 11. It is employed for making the points of the "*rhodium pens.*"

RINGWORM. *Syn.* SCALD-HEAD. PORRIGO. A disease that appears in circular patches of little pustules that afterwards form scabs, leaving a red pimply surface, and destroying the bulbs of the hair in its progress. It spreads rapidly, and is *very infectious*, often running through a whole school. It chiefly affects the neck, forehead, and scalp, of weakly children. The proper treatment consists in shaving the part, and keeping it clean with soap and water. When the scabbing commences, dressings of tar ointment, or the ointment of nitrate or nitric oxide of mercury of the London Ph., or a mixture of equal parts of the first, and either the second or third, should be applied in

each case, diluting the mixture with lard to suit it to the state of irritability of the part. (See ACETIC ACID.)

ROB. (*Arab.*, dense.) A term formerly applied to an inspissated vegetable juice.

ROCELLINE. *Syn.* ROCELLIC ACID. A fatty crystallizable substance, obtained from rocella tintoria, or dyer's orchil.

ROLL, WINE. *Prep.* Soak a French roll, or sponge-biscuit, in raisin or sherry wine, surround it by a custard or cream thickened with eggs, and add some spice and ornaments.

ROSACIC ACID. The red crystalline substance deposited by the urine of persons laboring under intermittent or nervous fevers. It is purified by alcohol.

ROUGE. *Syn.* ROUGE FOR THE TOILETTE. ROUGE D'ESPAGNE; FARD, (*Fr.*) *Prep.* Wash safflowers (any quantity) until the water comes off colorless; dry, powder, and digest in a weak solution of carbonate of soda; then place some fine cotton wool at the bottom of the vessel, and throw down the coloring matter by gradually adding lemon juice or white vinegar till it ceases to produce a precipitate. Next wash the cotton in cold water, then dissolve out the color with a fresh solution of soda, add a quantity of finely-powdered talc, or French chalk, proportional to the intended quality of the rouge; mix well, and precipitate as before; lastly, collect the powder, dry with great care, and triturate it with a *minute* quantity of oil of olives, to render it smooth and adhesive. *** This is the only article which will brighten a lady's complexion without injuring the skin. The relative fineness and proportion of talc employed determines the quality of the rouge.

†‡† *Rouge Indienne* is the terra persica, or Indian red, imported from Ormuz;—*Liquid Rouge*, the red liquid left from the preparation of carmine, or a solution of carmine in weak carbonate of potash water, or of pure rouge in alcohol acidulated with acetic acid;—*Rouge de Prusse*, burnt yellow ochre;—*Vert Rouge d'Athènes*, or "pure rouge," is obtained from safflowers as above, but without the use of any talc or French chalk; intense copper-bronze color when dry; red when moistened or diluted;—*Spanish Lady's Rouge* is cotton wool repeatedly wetted with ammoniacal solution of carmine, and dried.

ROUSSEAU'S DROPS. *Syn.* GOUTTES DE L'ABBE ROUSSEAU. VINUM OPII FERMENTATIONE PARATUM. *Prep.* Honey ℥xij; warm water lb. iv; set in a warm place till it begins to ferment, then add opium ℥iv; dissolved in water f℥xij; ferment for 1 month, filter, evaporate to ℥x; strain, and add rectified spirit ℥ivss. Milder than common laudanum. *Dose.* 5 to 30 drops.

ROYAL PREVENTIVE. *Syn.* WHITE WASH. A quack lotion formed of solution of diacetate of lead and proof spirit, of each ℥j; water 1 pint. *Used* against infection.

RUM. *Syn.* SPIRITUS SACCHARI. An ardent spirit obtained by distillation from the fermented skimmings of the sugar-boilers, (*sirup scum*,) the drainings of the sugar pots and hogsheads, (*molasses*,) the washings of the boilers, and occasionally the juice of the sugar-cane. Rum is imported from the West Indies, and the best comes from Jamaica. *Leeward Island Rum* is less esteemed. Rum owes its flavor to a volatile oil and butyric acid. The duty on West India rum is 9*s.* per proof gallon; that on East India 15*s.*; the latter amounts to a prohibition. The consumption of rum has long been declining in England; its place being supplied by gin or British brandy. In Jamaica it is usual to put sliced pine-apples into the puncheons containing the finer qualities of rum, which is then termed *pine-apple rum*. (See ALCOHOL.)

RUPERT'S DROPS are made by letting drops of melted glass fall into cold water; the drop assumes by that means an oval form with a tail or neck resembling a retort. They possess this singular property, that if a small portion of the tail is broken off, the whole bursts into powder with an explosion, and a considerable shock is communicated to the hand that grasps it.

RUSKS. *Prep.* 7 eggs well beaten; new milk ½ pint; melted butter ½ lb.; yeast ½ pint; sugar 3 oz.; beat well together with as much flour, added gradually, as will make a very light paste; let it rise before the fire for half an hour, then add a little more flour, form into small loaves or cakes 5 or 6 inches wide, and flatten them; bake moderately, and when cold, cut them into slices the size of rusks, and put them into the oven to brown a little. A nice tea-cake when hot, or with caraways to eat cold.

RUTILINE. A name given by Braconnot to the product of the decomposition of salicine by sulphuric acid. A brownish red solid, colored blood-red by acids, and violet by alkalis.

SABADILLIC ACID. *Syn.* CEVADIC ACID. A crystalline, fusible, volatile, fatty acid, obtained from the oil extracted by ether from the seeds of veratrum sabadilla. The sabadillate of baryta is prepared in the same way as the butyrate of baryta is from butter. When this salt is heated with concentrated phosphoric acid, the sabadillic acid sublimes in white needles. It has an odor resembling butyric acid.

SABADILLINA. An alkaloid obtained by Couerbe from cebadilla seeds. According to Simon, it is merely a compound of the resinates of soda and veratria.

SACCHARIC ACID. *Syn.* OXALHYDRIC ACID. *Prep.* Sugar or gum 1 part; nitric acid 2 parts; diluted with water 10 parts; dissolve by the aid of heat, and continue the heat as long as reaction takes place, then neutralize by carbonate of lime, precipitate by acetate of lead, and decompose the precipitate, suspended in water, by sulphureted hydrogen; neutralize the filtered liquid with potash, concentrate, and crystallize; redissolve the resulting *saccharate of potassa*, decolor by animal charcoal, reprecipitate by acetate of lead, and decompose the precipitated saccharate of lead by sulphureted hydrogen, as before. It forms salts with the bases called *Saccharates*.

SACCHAROMETER. (From *saccharum*, sugar, and *metrum*, a measure.) An hydrometer for determining the sp. gr. of brewer's and distiller's worts. (See HYDROMETER and BREWING.)

SACCHULMIC ACID. A light brown powder, obtained by Malaguti and Boullay, by boiling sugar along with dilute sulphuric acid It is solu-

ble in ammonia and the fixed alkalis, forming salts.

SACCHULMINE. An insoluble substance, obtained like the last, by boiling 10 parts of sugar, 30 of water, and 1 of sulphuric acid for a very long time. It is deposited in brilliant, brown scales, along with some sacchulmic acid. The latter is removed by the action of ammonia water.

SACHET. *Syn.* SACCULUS. Sachets are little bags, containing dry substances, used as local applications.

SACHET, ANTI-PHTHISIC. *Syn.* SACCULUS ANTI-PHTHISICUS. *Prep.* Dissolve ℥j of aloes in f℥xij strong decoction of fresh rue. Fold a large piece of soft muslin in 8 folds, large enough to cover the chest and part of the stomach. Steep it in the decoction and dry it in the shade. Wear it on the chest constantly. *** A celebrated domestic remedy for consumption.

SACK. (From *sec*, dry.) A wine used by our ancestors, supposed by some to have been Rhenish or canary; but, with more probability, by others to have been dry mountain or "vin d'Espagne; vin sec;" (Howell, Fr. and Eng. Dict., 1650.) Falstaff calls it "*sherris sack*," (sherry sack,) from *Xeres*, a sea town of Cordube, where that kind of sack (wine) is made. (Blount.)

SAFFRON. The prepared stigmata of the crocus sativus. There are two kinds of saffron found in commerce.—1. HAY SAFFRON (*crocus in fœno*) consists of the stigmas with parts of the style carefully dried. Of this sort the Spanish is the best.—2. CAKE SAFFRON, (*crocus in placentâ*.) This is properly merely the former compressed into cakes; but the cake saffron of commerce is now mostly, if not entirely, composed of safflower made into a paste with gum-water, and rolled out on paper into oval cakes 10 to 12 inches long, 9 or 10 broad, and one-tenth of an inch thick, and dried. "I can detect neither saffron nor marigold in them." (Dr. Pereira.) *Pur.* Saffron is largely adulterated; abroad it is frequently mixed with safflower, and in England with "*prepared marigolds*," or French (mock) saffron. These frauds may be detected by the inferiority of the color, and by soaking the leaves in water, when the stigmas of the crocus may be readily distinguished from the florets of safflower and the petals of marigolds. Winckler and Gruner propose to detect these substances by means of a solution of silver or of perchloride of iron. The infusion of true saffron is not altered by these reagents, but the extract of either of the above-mentioned adulterants is rendered opaque, and at length precipitated. (*Jahrbuch für Prakt. Pharm.*) The writer of this article knows one wholesale drug house alone, who a short time since had a stock of several hundredweight of prepared marigolds, which they not only employed to mix with genuine saffron, but sold extensively to the country dealers. Old and dry saffron is "*freshened up*" by rubbing it between the hand, slightly oiled.

SAGAPENUM. This substance is described in the London Pharmacopœia as a gum resin, the production of an uncertain species of ferula. The mass of the sagapenum sold to the retail trader is, however, factitious, and formed by mixing together asafœtida, galbanum, and other drugs in variable proportions. This is generally done by the conscientious druggists, by softening a mixture of 3 parts of asafœtida and 15 parts of galbanum, in a water or steam bath, and then stirring in about one-seventeenth of their weight of oil of turpentine, to which a little oil of juniper has been added. This mixture is called "gummi sagapeni OFF.," an inferior sort being made by adding sundry portions of yellow resin and paste of gum tragacanth to the above. (Cooley, Chem., v. 369.)

SAGO. A species of fecula or starch, obtained from the pith of the sago palm-tree. (See JELLIES.)

SALADS. These articles being eaten raw, are mostly of difficult digestion, especially those of the more cooling kind. They are, however, antiseptic, and tend to correct "the grossness" of animal food. They are made of various vegetables (either singly or mixed) seasoned with oil, vinegar, mustard, and other condiments. Salads are useful in scurvy.

SAL ALEMBROTH. *Syn.* HYDRARGYROCHLORIDE OF AMMONIA. SAL SAPIENTIÆ. *Prep.* Sal ammoniac and corrosive sublimate, equal parts; dissolve in water, evaporate, and crystallize.

SALEP. *Syn.* SALOP. The prepared root of the orchis mascula. It chiefly consists of bassoria and fecula. Mixed with boiling water, it forms a nutritious jelly.

SALICINE. A white, crystalline substance, discovered by Le Roux and Buchner, and obtained from several species of salix and populus. It is found in the bark and leaves of all bitter willows. *Prep* (Merck.) Exhaust willow bark by repeated coction with water, concentrate the mixed liquors, and while boiling, add litharge till the liquid is nearly decolored; remove the dissolved oxide of lead, first by sulphuric acid, and afterwards by sulphuret of barium; filter, and evaporate. The salicine that crystallizes must be purified by repeated solutions and crystallizations. From willow bark which is fresh and rich in salicine, it may be obtained by the cautious evaporation of the cold aqueous infusion.

Remarks. Salicine forms white, silky needles and plates, is bitter, inodorous, neutral, fusible at 230° F., and soluble in water and ether. Hydrochloric and dilute sulphuric acid convert it into a tasteless powder called *Saliretine*, which is insoluble in water, but dissolves in alkalis and alcohol With chlorine it forms *Chlorosalicine*. It has been given in dyspepsia, intermittents, and other diseases in which quinine is commonly administered. *Dose.* 10 to 30 grs.

SALICULIC ACID. A volatile, crystallizable acid discovered by Piria, and obtained by heating saliculous acid with caustic potash till the mixture turns white and gas is disengaged, and treating the residue with a mineral acid, to separate the potash.

SALICULOUS ACID. *Syn.* HYDRURET OF SALICULE. HYDRURET OF SPIROYLE. SALICULIC ACID? A nearly colorless, oily, inflammable liquid, discovered by Pagenstecher in the volatile oil of spiræa ulmaria, (*meadow-sweet*,) and by Piria, as a product of the decomposition of salicine. It is either obtained by distilling the oil of spiræa along with liquor of potassa, as long as oil comes over, decomposing the residuum of saliculite of potassa with dilute sulphuric acid, and again distilling, when saliculous acid comes over along with

water; or by distilling a mixture of 1 part each of salicine and bichromate of potash, 2½ parts of oil of vitriol, and 20 parts of water. The salicine is dissolved in part of the water, the acid diluted with the remainder, and the whole mixed in a retort, but not distilled till the effervescence ceases. *Prod.* 25§. (Ettling.) *** Saliculous acid is soluble in ether and alcohol, and slightly so in water. It combines with the bases to form salts called *saliculites.* It also forms several interesting compounds with iodine, bromine, chlorine, &c.

SALOOP. Sassafras (chips) tea flavored with milk and sugar. A wholesome and useful drink in cutaneous and rheumatic affections.

SALT. *Syn.* SEL, (*Fr.*) SALZ, (*Ger.*) SAL, *Lat.*, from ἅλς, *sea-salt.*) In CHEMISTRY, a compound of an acid with an alkali or a salifiable base, or of bromine, chlorine, fluorine, or iodine, with a metal. The names of the salts are derived from the acids which they contain; as *sulphate of soda,* a compound of sulphuric acid and soda; *sulphite of lime,* a compound of lime and sulphurous acid. When the name of a salt terminates in *ate,* it implies that the acid that it contains is at the maximum of oxidizement, (or ends with *ic,*) and when the name terminates in *ite,* that the acid contains less oxygen, (or ends with *ous.*)—*Neutral salts* are such as contain 1 eq. each of acid and base; *basic,* or *subsalts,* such as contain 2 or more atoms of base to one of acid; *acid,* or *supersalts,* such as contain more than 1 eq. of acid; *hydrous* or *hydrated* salts are such as contain water of crystallization, or combined water; *anhydrous salts,* those that are destitute of water. *Deliquescent salts* are those that attract moisture from the atmosphere; *efflorescent salts,* such as part with their combined water, and become opaque and pulverulent under like circumstances. The salts formed by the direct union of the archeal elements, chlorine, iodine, &c., as sea-salt, are termed *haloid salts,* and their names are formed by adding *ide* or *uret* to the first portion of the names of their electro-negative elements; as *chloride of sodium,* or common salt, a compound of *chlor*-ine and sodium; *iodide,* or *ioduret of iron,* a compound of *iod*-ine and iron. See OXIDE.

SALT OF WORMWOOD. *Syn.* SAL ABSINTHII. Carbonate of potash.

SALT, RED. Common salt wetted with an infusion of beet-root, or cochineal, or tincture of red sanders wood, then dried and rubbed through a sieve. *Used* to impart a color to gravies, &c. Infusion of saffron also gives a beautiful color for this purpose. *** It has been proposed to color Epsom salts in this way to distinguish them from oxalic acid.

SALT, SORE THROAT. *Syn.* SAL PRUNELLÆ. LAPIS DO. CRYSTAL MINERAL. *Prep.* Melt nitre, and when it flows smooth, pour it into moulds, either balls or cakes. *Prod.* 50§.

SALTS, SMELLING. *Syn.* SAL VOLATILE OLEOSUM. *Prep.* 1.—Sesquicarbonate of ammonia 1 lb.; oil of lavender 3 oz.; grind together, and sublime with a gentle heat.—2. To the last add, before distillation, oil of verbena ½ oz. Very fine.—3. Subcarbonate of potash and sal ammoniac, of each ℥viij; powder, add leaves of Syrian herb mastich (*marum Syriacum*) ℥ss; alcohol 1½ pints, holding in solution oil of cloves ʒss, oil of nutmeg ℈ij, oil of cinnamon ℈j, oils of sweet marjoram, lemon, and orange, of each ʒj; water 1 quart; distil with a very gentle heat, and stop the process as soon as the liquid that rises begins to dissolve the salt. Very fragrant.—4. (*Extemporaneous.*)—*a.* Sal ammoniac 1 dr.; pure potassa 3 dr.; grind together, and add essence of lemon 15 drops.—*b.* Sesquicarbonate of ammonia, bruised, q. s.; essential oil a few drops to perfume.

SALTING AND PICKLING. (In DOMESTIC ECONOMY.) This is best performed by well rubbing the meat with a mixture of salt 2 lbs.; saltpetre 2 oz.; and moist sugar 1½ oz., till every crevice is thoroughly penetrated, after which it should be set aside till the next day, when it should be covered with fresh salt in such parts as require it. It may then be advantageously placed in any proper vessel, and subjected to pressure, adding a little fresh salt as necessary, and turning it daily till sufficiently cured. When the brine as it forms is allowed to drain from the meat, the process is called *dry salting;* but when, on the contrary, it is allowed to remain on it, the article is said to be *wet salted.* On the small scale, the latter is most conveniently performed by rubbing the meat with salt, &c., as above, and after it has lain a few hours, putting it into a pickle formed by dissolving 4 lbs. of salt, ½ or 1 lb. of sugar, and 2 oz. of saltpetre in 2 gallons of water. This pickling liquor gets weaker by use, and should therefore be occasionally boiled down a little and skimmed, at the same time adding some more of the dry ingredients. *** The sooner meat is salted after being killed the better, as it then possesses considerable absorbent power, which it gradually loses by age. On this property is based the process of M. Gannal for the preservation of animals intended for food in a fresh state. This operation consists in injecting a solution of chloride of aluminum, at 10° Baume, into the carotid, by means of a syphon, as soon as the blood ceases to flow from the slaughtered animal; both extremities of the jugular vein being previously tied. 9 to 12 quarts of the solution are sufficient for an ox. When the animal has been well bled, and the injection skilfully performed, it is scarcely perceptible that the animal has undergone any preparation. The injected animal is cut up in the usual way; and when intended to be eaten within 2 or 3 weeks, merely requires to be hung up in a dry situation free from flies; but if it is to be kept for a longer period, it is directed to be washed with a mixed solution of common salt and chloride of aluminum at 10° B., and then simply dried and packed in clean air-tight barrels, and kept in a cool, dry place. If the air cannot be perfectly excluded, it should be packed in dry salt, not for the purpose of preserving it, but to prevent the vegetation of bissus; as without this precaution, the meat becomes musty, from exposure and the action of moisture. Meat preserved by this process may be kept for several years, and merely requires soaking for 24 hours in water, for the purpose of swelling its pores, to give it the appearance and taste of fresh meat, fit either for roasting or boiling.

SALVE. A name indiscriminately applied by the vulgar to any consistent, greasy preparation (See CERATES, OINTMENT, &c.)

SALVE, LIP. *Syn.* CERATUM LABIALE. *Prep.* —1. (*White.*) Spermaceti ointment or cerate 3 oz.; finely-powdered white sugar 1 oz.; scent q. s.; mix.—2. (*Red.*) Spermaceti ointment ½ lb.; alkanet root 1 oz.; melt together till sufficiently colored, strain, and when considerably cooled, add 20 drops of oil of lavender, or 3 drops of oil of rhodium, or otto of roses, or 1½ dr. of balsam of Peru.

SANDAL WOOD. *Syn.* RED SANDERS WOOD. SANTAL, (*Fr.*) SANDELHOLZ, (*Ger.*) LIGNUM SANTALI RUBRI; LIGNUM SANTALINUM RUBRUM, (*Lat.*) The wood of pterocarpus santalinus. Wool may be dyed a carmine red by dipping it alternately into an infusion of this wood, and an acidulous bath. (Trommsdorff.) Prepared with a mordant of alum and tartar, and then dyed in a bath of sandal wood and sumach, it takes a reddish yellow. (Bancroft.) The coloring principle of red sanders wood is called *santaline*, and may be obtained as a reddish resinous mass by evaporating its alcoholic infusion, or by digesting the rasped wood in ammonia water, and precipitating by an acid. Its spirituous solution gives a rich purple precipitate with protochloride of tin, and a violet one with acetate of lead.

SANDIVER. *Syn.* SEL DE VERRE. GLASS GALL. FEL VITRI. The saline scum that swims on glass when first made. It is occasionally used in tooth powders.

SANGUINARIN. Obtained from the root of sanguinaria Canadensis by digesting it in anhydrous alcohol, precipitating by water of ammonia, washing the red precipitate in water, boiling with water and animal charcoal, filtering, and digesting the solid portion in alcohol; this solution by distillation yields a pearl-gray or yellowish substance which is sanguinarin. It excites sneezing, and is turned red by acids.

SANTONINE. *Prep.* Worm seed (*semen cynæ*) 4 parts; slaked lime 2 parts; alcohol of 90%, 20 parts; digest, evaporate the clear liquid, dissolve in dilute acetic acid, filter, again evaporate, dissolve in 10 parts of alcohol at 80%, and boil with some animal charcoal. The filtered liquid deposites colorless crystals of santonine as it cools. Tasteless, inodorous, fusible, volatizable, soluble in ether and alcohol, and slightly so in water. It is much esteemed as "*a tasteless worm medicine,*" and is especially adapted to remove lumbricales, (large round worms.) *Dose.* 10 to 30 grs. repeated night and morning, followed by a brisk purge.—*Lozenges of Santonine.* Santonine ʒj; sugar ℥v; tragacanth ʒss; all in powder; make a mass with water and divide into 144 lozenges. *Dose* for a child 5 to 10 daily.

SAPONINE. A white non-crystallizable substance obtained by the action of alcohol on the root of saponaria officinalis, (*soap wort.*) It is soluble in water, and the solution froths strongly on agitation. The smallest quantity of the powder causes violent sneezing. By the action of acids and alkalis it is converted into a white powder termed *saponic acid*, which is soluble in alcohol.

SARSAPARILLA. *Syn.* RADIX SARZÆ, (*Lat.*) The *Jamaica*, *red Jamaica*, or *red-bearded sarsaparilla*, is the variety which should alone be used in medicine. This kind yields 33 to 40% of its weight of extract, (Hennell, Battley, Pope,) and contains less starchy matter than the other varieties. It is distinguished by the dirty orange-reddish color of its bark, and by its cold decoction being *darkened*, but not rendered *blue* by a solution of iodine. Its powder has also a pale reddish brown color. The other varieties of sarsaparilla, viz.—the *Lisbon*, *Lima*, *Vera Cruz*, and *Honduras*, are frequently substituted for the *Jamaica* by the fraudulent druggist in the preparation of the decoction and extracts of this drug; but the products are vastly inferior in *quantity*, *color*, *taste*, and *medicinal virtue.* Decoction of sarsaparilla, when made with the Honduras root, is very liable to ferment even by a few hours' exposure in hot weather. I once saw a pan holding 3 hogsheads of the strong decoction, that had been left exposed all night, in as active a state of fermentation as a gyle of beer; it bore a frothy head, and evolved a most disagreeable odor, that was not wholly removed by several hours' boiling.

SARSAPARILLINE. *Syn.* SMILACIN. SALSEPARIN. PARALLINE. PARIGLIN. PARALLINIC ACID. A white, crystallizable, odorless, and nearly tasteless substance, discovered by Palotta and Folchi, in sarsaparilla. It is best obtained by treating the bark of Jamaica sarsaparilla with hot alcohol, decoloring the solution by animal charcoal, and repeatedly dissolving and crystallizing the impure smilacin that deposites as the liquid cools. It may also be extracted by boiling water. Water holding a very small quantity of this substance in solution, froths considerably on agitation. This is especially the case with infusion of Jamaica sarsaparilla, and this property has consequently been proposed as a test of the quality of sarsaparilla root. *Dose.* 2 to 10 grs. in the usual cases in which the root is given.

SAUCES. *Prep.*—1. (*Anchovy.*) 3 or 4 anchovies, chopped; butter 3 or 4 oz.; water 2 oz.; vinegar 2 tablespoonfuls; flour 1 do.; stir over the fire till it thickens, then rub it through a coarse hair-sieve.—2. (*Chetney. Quihi do.*) Sharp apples, pared and cored, tomatoes, salt, brown sugar, and raisins, of each 8 oz.; red chillies, and powdered ginger, of each 4 oz.; garlic and shalotes, of each 2 oz.; pound well, add vinegar 3 quarts, and lemon juice 1 do.; digest with frequent agitation for a month, pour off nearly all the liquor, and bottle. *Used* for fish or meat, either hot or cold, or to flavor stews, &c. The residue is the *Chetney*, and must be put into pots or jars. It is used like mustard.—3. (*Fish.*) *a.* Port wine 1 gallon; mountain 1 quart; walnut ketchup 2 quarts; anchovies and liquor 2 lbs.; 8 lemons; 36 shalotes; scraped horseradish 1½ lb.; flour of mustard 8 oz.; mace 1 oz.; Cayenne q. s.; boil up gently, strain, and bottle.—*b.* 24 anchovies; 10 shalotes; scraped horseradish 3 spoonfuls; mace and cloves, of each ¼ oz.; 2 sliced lemons; anchovy liquor 8 oz.; water 1 pint; Hock or Rhenish wine 1 bottle; walnut ketchup ½ pint; boil to 2½ lbs., strain, and bottle.—4. (*Quin's.*) *a.* Walnut pickle, and port wine, of each 1 pint; mushroom ketchup 1 quart; anchovies and shalotes, chopped, of each 2 dozen; soy ½ pint; Cayenne ¼ oz.; simmer for 10 minutes strain, and bottle.—*b.* Walnut pickle, mushroom ketchup, and soy, of each 1 pint; chopped cloves

of garlic and anchovies, of each 1 dozen; Cayenne and bruised cloves, of each 1 dr. As last.—5. (*Sauce Superlative.*) Port wine and mushroom ketchup, of each 1 quart; walnut pickle 1 pint; pounded anchovies ½ lb.; lemon peel, minced shalotes, and scraped horseradish, of each 2 oz.; allspice and black pepper, bruised, of each 1 oz.; Cayenne pepper and bruised celery seed, of each ¼ oz., (or currie powder ¾ oz.;) digest 14 days, strain, and bottle.—6. (*Tomato.*) Bruised tomatoes 1 gallon; salt ½ lb.; in 3 days press out the juice, to each quart add shalotes 2 oz.; black pepper 1 dr.; boil for 30 minutes, strain, add mace, allspice, ginger, and nutmegs, of each ½ oz.; coriander seed and cochineal, of each 1 dr.; simmer gently for 15 minutes, strain, cool, and bottle.—7. (*Sauce Aristocratique.*) Green walnut juice, anchovies, equal parts; cloves, mace, and pimento, bruised, of each 1 dr. to every pound of juice; boil and strain, then to every pint add 1 pint of vinegar, ½ pint of port wine, ¼ pint of soy, and a few shalotes. Let the whole stand for a few days, and decant the clear liquor.—8. (*Sauce au Roi.*) Brown vinegar (good) 3 quarts; soy and walnut ketchup, of each ½ pint; cloves and shalotes, of each ½ doz.; Cayenne pepper 1 oz.; mix, and let them stand for 14 days.—9. (*Sauce Piquante.*) Soy 1 part; port wine and Cayenne, of each 2 parts; brown vinegar 16 parts; mix, and let them stand for 3 or 4 days before bottling.

SAUR KRAUT. *Prep.* Clean white cabbages, cut them into small pieces, and stratify them in a cask along with salt and a few juniper berries and caraway seeds, observing to pack them down as hard as possible with a wooden rammer, and to cover them with a lid pressed down with a heavy weight. The cask should be placed in a cold situation as soon as a sour smell is perceived. Much used by the northern nations of Europe.

SAUSAGES. Fat and lean of pork or beef chopped small, flavored with spice, and put into skins, or pressed into pots. Crumb of bread is also frequently added.

SAVELOYS. *Prep.* Young pork, free from bone and skin, 3 lbs.; salt it with 1 oz. of saltpetre, and ½ lb. of common salt for 2 days; chop it fine; put in 3 teaspoonfuls of pepper; 1 doz. sage leaves chopped fine, and 1 lb. of grated bread; mix it well, fill the skins, and bake them half an hour in a slack oven. They are good either hot or cold.

SAVONETTES, (*Fr., Wash-balls.*) *Prep.* 1. (*Communes.*)—*a.* Soap 5 lbs.; starch 2 lbs.; essence of orange or citron 1 oz.; eau pour la barbe 1 gallon; beat together, and form into balls.—*b.* Soap shavings 5 lbs.; eau de citron 1 quart; digest, force it through a coarse cloth, add starch 2 lbs., and essence of orange or citron 1 oz.; mix well. As last.—2. (*Sand balls.*) Soap and silicious sand, of each 1 lb.; perfume (any) q. s.—3. Soap shavings 1 lb.; orange flower or rose water ½ pint; mix, and when sufficiently soft, add scent q. s., and form into balls.

SCAMMONY. The mass of the scammony of the shops is adulterated. The following receipts are current for factitious Smyrna scammony:—1. Aleppo scammony 1 lb.; jalap 7 lbs.; senna and charcoal, of each 2 lbs.; manna 6 lbs.; gamboge 4 lbs.; ginger ½ lb.; sirup of buckthorn, q. s.—2. Jalap 2 lbs.; senna, Aleppo scammony, and gamboge, of each 8 oz.; charcoal and ginger, of each 4 oz.; as last.—3. Aleppo scammony 1 lb.; extract of jalap 5 lbs.; gum guaiacum and sago, of each 10 lbs.; ivory-black 4 lbs.; mix. These imitations may be detected by the want of the resinous fracture of true scammony, and by their inferior solubility. Sulphuric ether separates from pure scammony fully 78% of resinous matter dried at 280° F.; and its cold decoction is neither rendered *blue* by iodine, nor its tincture turned *green* by nitric acid.

SCARLET DYE. *Proc.* (*For 1 lb. of cloth.*) Cream of tartar 1¼ oz.; water q. s.; boil in a block-tin vessel, and when dissolved, add solution of tin (made by dissolving 2 oz. of grain tin in a mixture of 1 lb. each of nitric acid and water, and 1½ oz. of sal ammoniac) 1¾ oz.; boil for 3 minutes, then introduce the cloth and boil it for 2 hours; drain and cool. Next, take cream of tartar ½ oz.; water q. s.; boil, and add powdered cochineal 1 oz.; boil for 5 minutes, then gradually add solution of tin 1 oz., stirring well all the time; lastly, put in the goods and dye as quickly as possible. (Poërner.)

SCENTS, POMATUM. *Prep.*—1. (*Cowslip.*) Essence of bergamotte 1 lb.; essence of lemon ½ lb.; oil of cloves ¼ lb.; mix.—2. (*Jonquille.*) Essences of bergamotte and lemon, of each, 8 oz.; oil of cloves 2 oz.; oils of sassafras and orange, of each, 1 oz.; mix.—3. (*Millefleur.*) Essence of ambergris 4 oz.; essence of lemon 3 oz.; oil of cloves and English oil of lavender, of each, 2 oz.; essence of bergamotte 1 oz.; mix.

SCHWARTZ' DROPS. *Prep.* Barbadoes tar f℥j; tincture of asafœtida f℥iss; mix. *Dose.* 40 drops 3 times a day for tapeworm.

SCHEELE'S GREEN. *Syn.* Arsenite of Copper. *Prep.* Powdered arsenious acid 11 oz.; carbonate of potash 2 lbs.; boiling water 1 gallon; dissolve, filter, and add the solution, gradually, to a filtered solution of 2 lbs. of crystallized sulphate of copper in 3 gallons of water, as long as it produces a grass-green precipitate; well wash with warm water and dry. *Prod.* 1½ lb. A very fine color. *Used* as a paint.

SCILLITIN. *Syn.* Scillitina. Scillitite. A whitish, resinous, transparent, bitter, deliquescent substance, obtained from squills. It is soluble in water, alcohol, and acetic acid, and is purgative and poisonous.

SCUDAMORE'S GOUT LOTION. *Prep.* Camphor mixture f℥ix; alcohol f℥iij; mix. Applied on rags or poultices, adding, for the former, enough hot water to warm it.

SCURVY. *Syn.* Scorbutus. The treatment of ordinary cases of this disease mainly consists in employing a diet of fresh animal and green vegetable food, and mild ale, beer, or lemonade, as beverages, scrupulously avoiding salted and dried meat.

SEA SICKNESS. The most effectual preventive is the horizontal position. When there is much pain, a few drops of laudanum may be taken, or an opium plaster applied over the region of the stomach. Persons should put their stomach and bowels in proper order by the use of mild aperients, and an emetic if required, before proceeding to sea, when it will generally be found,

that a glass of warm weak brandy and water, to which 15 or 20 drops of laudanum, or still better 1 or 2 drops of creosote have been added, will effectually prevent any disposition to sea sickness, provided excess in eating and drinking is at the same time avoided.

SEBACIC ACID. (From *sebum*, suet.) *Prep.* Distil fat. oil, or suet, in an earthen retort, and treat the product with hot water as long as that liquid deposites any thing on cooling; wash the crystals in cold water, and crystallize from hot water, repeating the process till the crystals become colorless. Volatile, light, pearly scales, resembling benzoic acid. With the bases it forms salts called *sebates.* It is very soluble in hot water, ether, and alcohol.

SEDATIVE. *Syn.* SEDATIVUS. (*Lat.*, from *sedo*, to ease or assuage.) Medicine that diminishes the animal energy without destroying life: opium, henbane, and several of the neutral salts and acids, are sedatives.

SELENIUM. (From Σεληνη, *the moon.*) A chemical element discovered by Berzelius in 1818.

Prep. (Magnus.) Native sulphuret of selenium 1 part; binoxide of manganese 8 parts; expose the mixture to a low red heat in a glass retort, the beak of which dips in water.

Props, *&c.* A brittle opaque substance, having somewhat the appearance of lead, when in mass, but forming a deep red powder; sp. gr. 4·30 to 4·32; softens at 212°; fuses at 220°; boils at 650°. With the metals it forms compounds called *seleniurets.*—*Oxide of selenium* is a gaseous substance obtained by heating selenium in a vessel of air, and washing the product with water.—*Selenious acid* may be obtained by digesting selenium in aqua regia or nitric acid, and evaporating to dryness. It may be sublimed unchanged, is soluble in water and alcohol, and forms salts with the bases, termed *selenites.*—*Selenic acid* is best obtained by fusing selenium or seleniuret of lead along with nitrate of soda or potassa, acting on the fused mass with water, filtering, boiling briskly to throw down the seleniate of soda, cooling to separate the nitrate of soda, and repeating the process until all the former salt is separated. The seleniate of soda is then decomposed by nitrate of lead, and after well washing the precipitate, it is decomposed by sulphureted hydrogen, when a solution of selenic acid is obtained. It is a colorless liquid, and forms salts called *seleniates.*—*Seleniureted hydrogen* (*hydroselenic acid*) is obtained by the action of dilute sulphuric acid on the protoseleniuret of iron, manganese, or potassium. It is a colorless gas, freely absorbed by water. Its most remarkable property is its power of irritating the nose, exciting catarrhal symptoms, and destroying the sense of smell. This has led to the suggestion by Dr. Prout, that the evolution of this substance by volcanoes, and its diffusion through the atmosphere, may be the cause of certain forms of the epidemic disorder called influenza.—*Sulphuret and phosphoret of selenium* are made by simply fusing their elements together.

SENEGINE. *Syn.* POLYGALINE. POLYGALIC ACID. A white odorless powder discovered by Gehlin in the bark of seneka root, (*Polygala Senega.*) It is a powerful errhine and poison. It is volatile, and soluble in water and alcohol.

SEPIA. The ink of the cuttle fish. 1 part is capable of making 1000 parts of water nearly opaque. The dried native sepia is prepared for artists by boiling it for a short time in a weak lye of caustic alkali, precipitating by an acid, and well washing the precipitate, and drying it by a gentle heat. A fine brown color. *Used*, like Indian ink, by artists.

SEVUM, PREPARED. Mould candles, at least 2 years old, melted by a very gentle heat and strained from the wicks. (Pharm. Journal.) *Used* to make mercurial ointment. Triturated with 8 to 12 times its weight of quicksilver, it extinguishes the globules in less than a quarter of an hour. *** The *magnetic adeps* sold for the same purpose, is made by pouring melted lard, in a small stream, into cold water, placing the thin fragments thus obtained in a sieve covered with paper, or other suitable apparatus, and exposing it to the air for 3 or 4 months. (Guibourt.) Speedily "kills" 30 or 40 times its weight of silver. "Fresh lard reduced by oil of almonds, or a gentle warmth, to the consistence of a thick cream, will extinguish 7 or 8 times its weight of running mercury." (Ann. de Chim.)

SHERBET. (*Arab.*) A cooling drink used in the East, prepared with the juices of fruit and water, variously sweetened and flavored.

SHOEMAKER'S BLACK. A solution of copperas in water. Rubbed on leather it turns black.

SHOT METAL. Lead 1000 parts; arsenic 3 parts: or if the lead is coarse, 6 to 8 parts.

SHRUB. A species of concentrated cold punch. *Prep.* I. (*Brandy Shrub.*) *a.* Brandy 1 gallon; orange and lemon juice, of each 1 pint; peels of 2 oranges; do. of 1 lemon; digest for 24 hours, strain, and add white sugar 4 lbs., dissolved in water 5 pints. *b.* Brandy at proof 34 gallons; essential oils of oranges and lemons, of each 1 oz., dissolved in rectified spirit 1 quart; good lump sugar 300 lbs.; dissolved in water 20 gallons; mix well by rummaging, and gradually and cautiously add of a solution of tartaric acid in water, or of Seville orange juice q. s. to produce a pleasant but scarcely perceptible acidity; next "rummage" well for 15 minutes, add water to make the whole measure exactly 100 gallons, and again "rummage" well for half an hour; lastly, bung down loosely; in 10 or 12 days it will usually be sufficiently brilliant to be racked. This is 66 u. p.

II. (*Rum Shrub.*) As the last, but substituting rum for brandy.

III. (*Punch Shrub.*) Concentrated punch, made with equal parts of spirit and water. *Used* to make punch.

IV. (*Lemonade Shrub.*) Concentrated lemonade. *Used* to make lemonade or lemon sherbet.

Remarks. Rum shrub is the kind in the greatest demand, and that having a slight preponderance of the orange flavor is the most esteemed. If wholly flavored with lemon, it is apt to acquire a kind of "dead" or "musty" flavor by long keeping. The substitution of a few gallons of brandy for a portion of the rum, or the addition, after racking, of about 1 oz. each of bruised bitter almonds, cloves, and cassia, the peels of a dozen or 15 oranges, and a "*thread*" of the essences of ambergris and vanilla, renders it delicious. *** I

have employed the above formulæ for the manufacture of some score hogsheads of shrub, which have been highly admired in the wholesale trade.

SIGHS OF LOVE. *Prep.* *a.* Spirit at 18° B. 1 gallon; white sugar 4 lbs., dissolved in water ½ gallon; mix, perfume with otto of roses, and color to a pale pink with cochineal. *b.* As last, but dissolve the sugar in rose water, and omit the otto. A pleasant cordial.

SIGNATURES, FAC-SIMILES OF. *Proc.* Write your name on a piece of paper, and while the ink is wet, sprinkle over it some finely-powdered gum arabic, then make a rim round it, and pour on it some fusible alloy in a liquid state. Impressions may be taken from the plates formed in this way, by means of printing ink and the copperplate press.

SILICA. *Prep.* Levigated porcelain, plaster of Paris, and iron filings, equal parts; mix, and make them into a paste with the thickest quick-drying copal varnish. *Used* to fill hollow teeth.

SILICA. *Syn.* SILICIC ACID. SILEX. SILICIOUS EARTH. (From *silex*, a flint, or *χαλιξ*, *a pebble*.) The earth of flints, and the basis of glass and all silicious minerals.

Prep. 1. Heat quartz or rock crystal to redness, plunge it into cold water, dry, and powder. Insoluble. 2. Powdered quartz, as last, 1 part; carbonate of potash 3 parts; fuse together. This substance (*soluble glass*) dissolves in water, forming a true solution, (*liquor of flints*, silicum liquor,) from which concentrated acids throw down a *gelatinous hydrate of silicic acid.*

SILICO-FLUORIDES. Double fluorides, formed by precipitating or saturating silico-hydrofluoric acid with the bases. (See FLUOSILICIC ACID.)

SILICON. *Syn.* SILICIUM. The combustible base of silica. It was first procured by Berzelius in 1824, by the action of potassium on fluosilicic acid; but it is more conveniently obtained from the double fluoride of silicon and potassium or sodium, previously dried at nearly a red heat. This substance, gently heated with potassium in a glass tube, and the resulting compound washed with water, yields silicon under the form of a dark brown powder. It dissolves in a mixture of nitric and fluoric acids, and burns or explodes when heated with the hydrates and carbonates of the alkalis. It is permanent in the air, even when heated.

SILKS. No silks look well after washing, however carefully it be done, and this method should therefore never be resorted to, but from absolute necessity. It is recommended to sponge faded silks with warm water and soap, then to rub them with a dry cloth on a flat board, after which to iron them on the inside with a smoothing iron. Sponging with spirits will also improve old black silks. The ironing may be done on the right side, with thin paper spread over them to prevent glazing.

SILLABUB. *Prep.* Grate off the peel of a lemon with lump-sugar, and dissolve the sugar in ¼ of a pint of wine; add the juice of ½ a lemon, and ½ of a pint of cream; beat the whole together until of a proper thickness, and then put it into glasses. ⁂ Milk 1 pint is often substituted for cream, and cider or perry for wine. Grated nutmeg is often added. When "whipt" to a froth it is called "*whipt sillabub.*"

SILVER. *Syn.* SILBER, (*Ger.*) ARGENT, (*Fr.*) ARGENTUM, (*Lat.*) DIANA; LUNA, (*Alc.*) This metal, like gold, appears to have been as much valued in the most remote ages of antiquity of which we have any record, as at the present day. It is procured from its ores chiefly by amalgamation and cupellation. Its sp. gr. is 10·474, and melting-point 1873°, (Daniell,) or bright redness. It is soluble in nitric acid, and in sulphuric acid by the aid of heat. REFINED SILVER (*Argentum Cupellatum*) is silver that has passed the cupel. (See ASSAYING.) PURE SILVER is obtained by placing a copper rod in a solution of the nitrate, digesting the precipitate in caustic ammonia, and washing with water; or by boiling recently precipitated and still moist chloride of silver in a bright iron vessel along with water. SILVER LEAF (*Argentum foliatum*) is used by dentists, and for silvering. It is only $\frac{1}{100000}$th of an inch thick. SILVER SHELLS are used by artists, and are made like gold shells. SILVER DUST (*Crocus argenti*) is pure pulverulent silver obtained as above, and used by japanners.

Pur., Tests, &c. "Entirely soluble in diluted nitric acid. This solution, treated with an excess of muriate of soda, gives a white precipitate entirely soluble in ammonia water, and a fluid which is not affected by sulphureted hydrogen." (P. E.) The nitric solution of silver gives,—1. A *white curdy* precipitate (*chloride of silver*) with muriatic acid, soluble in ammonia and insoluble in nitric acid, and blackened by exposure to light. 2. It gives *white* precipitates with solutions of the alkaline carbonates, oxalates, and prussiates. 3. It gives *yellow* precipitates with the alkaline arsenites and phosphates. 4. With the arseniates, *red* precipitates. 5. With the fixed alkalis, *brown* precipitates. 6. With sulphureted hydrogen, a black powder, and,—7. With phosphorus and metallic copper, *pure silver.*

SILVER, CHLORIDE OF. *Syn.* ARGENTI CHLORIDUM. *Prep.* Precipitate a solution of chloride of silver by dilute muriatic acid; wash and dry in the shade. *Dose.* 3 grs. 3 or 4 times daily; in epilepsy, chronic dysentery, diarrhœa, &c. (Dr. Perry.)

SILVER, CYANIDE OF. *Syn.* HYDROCYANATE OF SILVER. CYANODIDE OF DO. ARGENTUM ZOOTINICUM. (See CYANIDE OF SILVER.)

SILVER, FULMINATING. *Syn.* ARGENTUM FULMINANS. FULMINATE OF SILVER. *Prep.* I. Digest oxide of silver (recently precipitated, and dried by pressure between bibulous paper) in concentrated liquor of ammonia for 12 or 15 hours, pour off the liquid, and cautiously dry the black powder in the air. The decanted ammonia, when gently heated, yields, on cooling, small crystals, which possess a still more formidable power of detonation, and will scarcely bear touching, even while under the liquid.

II. Dissolve chloride of silver in liquor of ammonia, cautiously add fragments of pure potassa, and when effervescence ceases, decant, and wash and dry the powder. Inferior.

III. (Brunatelli's.) Silver 1 part; nitric acid (sp. gr. 1·36 to 1·38) 10 parts; dissolve at a gentle

heat, and add the solution to alcohol of 85%, 20 parts; apply a gentle heat till the liquid begins to boil, then remove it from the fire, and set it aside to cool; the fulminate of silver is deposited in lustrous, snow-white, acicular crystals, and when washed and dried, equals in weight the silver employed. (Liebig.)

Remarks. This compound is exploded by the slightest friction or percussion; and should therefore be only made in *very small quantities* at a time, and handled with *great caution.* Its explosive powers are tremendous; in fact, it can hardly be handled with *safety*, even in the moist state. Many frightful accidents have happened from the spontaneous explosion of this substance. 1 or 2 grains are the most that can be exploded with safety.

SILVER, GERMAN. *Syn.* NICKEL SILVER. ALBATA. WHITE COPPER. *Prep.* 1. (Gersdorff.) Nickel and zinc, of each 1 part; copper 2 parts. Very fine. 2. (Gersdorff.) Nickel 25 parts; zinc 20 do.; copper 60 do. *Used* for rolling. 3. (Gersdorff.) Nickel and zinc, of each 20 parts; copper 60 do.; lead 3 do. For castings. 4. (Gersdorff.) To either of the above add 2 to 3% of white sheet iron. 5. (Keferstein.) Copper 40½ parts; nickel 31½ do.; zinc 25½ do.; iron 2½ do. This resembles the genuine German silver made from the ore of Hildburghausen, as well as Pakfong, as analyzed by Dr. Fyfe. 6. (Keferstein.) Nickel and zinc, of each 7 parts; copper 5 do. This is the composition of the *Chinese white copper*, *Tutenag* or *Pakfong*. 7. Nickel 15 parts; copper 21 do.; zinc 28 do. Malleable, resembles the Chinese pakfong. *** All the above are used as substitutes for silver.

SILVER, IODIDE OF. *Syn.* ARGENTI IODIDUM. *Prep.* Precipitate a solution of nitrate of silver by another of iodide of potassium. Greenish yellow; insoluble in water and ammonia. *Used* in some of the French hospitals.

SILVER, NITRATE OF. *Syn.* ARGENTI NITRAS. *Prep.* (P. L.) Pure silver ℥iss; nitric acid f℥j; diluted with water f℥ij; dissolve by the heat of a sand-bath, evaporate till ebullition ceases and the water is expelled, then pour it into (iron) moulds. In this state it forms the LUNAR CAUSTIC (*Causticum Lunare, Argenti Nitras Fusum, Argentum Nitratum*) of the shops; but when the solution is cautiously evaporated and crystallized, it forms colorless, transparent, rhombic prisms, (*Argenti Nitratis Crystalli; Crystalli Lunares.*)

Remarks. Pure nitrate of silver is entirely soluble in water, yielding a colorless solution, from which metallic silver is precipitated by a piece of bright copper. The fused nitrate is originally white, but is darkened by exposure to light and contact with organic matter. "29 grs. dissolved in f℥j of water acidulated with nitric acid, precipitated by a solution of 9 grs. of muriate of ammonia, briskly agitated for a few seconds, and then allowed to rest a little; yields a clear supernatant liquor, which is still precipitable by more of the test." (P. E.) *Dose.* One-sixth of a grain gradually increased, 2 or 3 a day, made into a pill with crumb of bread, in chorea, epilepsy, &c. Its continued use colors the skin. It is also used externally. *Antidote.* A solution of common salt, emetics, and demulcents.

SILVER, OXIDE OF. *Syn.* ARGENTI OXYDUM. *Prep.* Precipitate a solution of nitrate of silver by lime water, or a solution of potassa; wash and dry in the shade at a gentle heat. Olive-brown, darkened by light. *Dose.* ½ gr. in epilepsy, gastralgic irritations, &c. It is much used in France.

SILVER, POWDER OF. *Syn.* ARGENTI PULVIS. *Prep.* Heat the oxide to a dull red in a porcelain crucible, cool, triturate in an agate mortar, and pass it through a fine sieve. Both this and the last are used at the hospital of Montpellier.

SILVER, SULPHATE OF. *Syn.* ARGENTI SULPHAS. Prepared by dissolving silver in sulphuric acid containing one-tenth of nitric acid; or by precipitating a solution of the nitrate by another of sulphate of soda. It dissolves in 80 parts of hot water, and falls in small needles as the solution cools.

SILVER, SULPHURET. Prepared by passing sulphureted hydrogen through a solution of nitrate of silver.

SILVERING OF METALS. The art of covering the surface of bodies with a thin coating of silver.

Proc. I. (*Leaf Gilding.*) This is performed with leaf silver in the way described at p. 334, for Gilding of Polished Metals.

II. (*Cold Silvering.*) Mix 1 part of chloride of silver with 3 parts of pearlash, 1½ parts of common salt, and 1 part of whiting, and well rub the mixture on the surface of brass or copper, (previously well cleaned,) by means of a piece of soft leather, or a cork moistened with water and dipped into the powder. 1 part of precipitated silver powder, mixed with 2 parts each of cream of tartar and common salt, may also be used in the same way. When properly silvered the metal should be well washed in hot water slightly alkalized, and then wiped dry.

III. (*By the electrotype.*) M. de Ruolz performs this by means of a solution of oxide of silver in cyanide of potassium, in the way described in the article Voltaic Gilding. Citrate of silver has also been used with advantage.

*** *Leather, paper, wood, &c.,* are silvered with silver leaf by a similar process to that employed in gilding them.

SILVERING OF GLASS. *Proc.* I. Mirrors are silvered as follows:—A sheet of tin foil corresponding to the size of the plate of glass is evenly spread on a perfectly smooth and solid marble table, and every wrinkle on its surface is carefully rubbed down with a brush; a portion of mercury is then poured on, and rubbed over the foil with a clean piece of soft woollen stuff, after which two rules are applied to the edges, and mercury poured on to the depth of a crown piece, when any oxide on the surface is carefully removed, and the sheet of glass, perfectly clean and dry, is slid along over the surface of the liquid metal, so that no air, dirt, or oxide, can possibly either remain or get between them. When the glass has arrived at its proper position, gentle pressure is applied, and the table sloped a little to carry off the waste mercury, after which it is covered with flannel, and loaded with heavy weights; in 24 hours it is removed to a wooden table and further slanted, and this position

is progressively increased during a month, till it becomes perpendicular.

II. (*Drayton's Patent.*) *Proc.* A mixture is first made of coarsely-pulverized nitrate of silver 1 oz.; spirits of hartshorn ½ oz., and of water 2 oz.; which, after standing for 24 hours, is filtered, (the deposite upon the filter, which is silver, being preserved,) and an addition is made thereto of spirit, (by preference, spirit of wine,) at 60° above proof, or naphtha 3 oz.; from 20 to 30 drops of oil of cassia are then added; and, after remaining for about 6 hours longer, the solution is ready for use. The glass to be silvered is well cleaned and polished, placed in a horizontal position, a wall of putty, or other suitable material, formed around it, and the solution poured over it to the depth of from ⅛ to ¼ inch; from 6 to 12 drops of a mixture of oil of cloves and spirit of wine (in the proportion of 1 part, by measure, of oil of cloves, to 3 of spirit of wine) are next dropped into it, at different places; or the diluted oil of cloves may be mixed with the solution before it is poured upon the glass. The more oil of cloves used, the more rapid will be the deposition of the silver; but the patentee prefers that it should occupy about 2 hours. When the required deposite has been obtained, the solution is poured off; and as soon as the silver on the glass is perfectly dry, it is varnished with a composition formed by melting together equal quantities of beeswax and tallow. The solution, after being poured off, is allowed to stand for 3 or 4 days in a close vessel; as it still contains silver, and may be again employed after filtration, and the addition of a sufficient quantity of fresh ingredients to supply the place of those which have been used. The patentee states, that, by experiment, he has ascertained that about 18 grains of nitrate of silver are used for each square foot of glass; but the quantity of spirit varies somewhat, as its evaporation depends upon the temperature of the atmosphere, and the duration of the process. If the glass be placed in an inclined, or even a vertical position, and the surface covered over, leaving a narrow space for the solution between the surface of the glass and the cover, which fits close, then, by using spirit without water in the mixture, the object will be accomplished. By the addition of a small quantity of oil of caraway or thyme, the color of the silver may be varied. (Newton's Journal.) This method seems likely to supersede all others for silvering mirrors, and the backs of diamonds and pastes.

SIRUP. *Syn.* Sirop; Syrop, (*Fr.*) Syrupus, (*Lat.*, from *serab*, Arab., *a potion.*) A thick solution of sugar in water, either simple, flavored, or medicated. In the preparation of sirups care should be taken to employ the best refined sugar, as they will thus be rendered less liable to spontaneous decomposition, and if made with distilled water, or filtered rain water, will be perfectly transparent, without the trouble of clarification. When the latter operation is required, it should be conducted in the manner described at article Capillaire. When vegetable solutions enter into the composition of sirups, they should be rendered perfectly transparent by filtration or clarification, before being added to the sugar. In general, 2 lbs. (av.) will be required to every imperial pint of water or thin aqueous fluid to make a sirup of a proper consistence or density, which will allow for the portion that is lost by evaporation during the process. It is proper to employ as little heat as possible, as a solution of sugar, even when kept at the temperature of boiling water, undergoes slow decomposition. A good plan is to pour the water (cold) on the sugar, and to let the two lie together for a few hours, occasionally stirring, and then to apply a gentle heat (preferably that of steam or a water-bath) to finish the solution. Some persons (falsely) deem a sirup ill prepared unless it has been allowed to boil; but if this method be adopted, the ebullition should be only of the gentlest kind, (*simmering*,) and should be checked after the lapse of 1 or 2 minutes. If it be desired to thicken a sirup by boiling, a few fragments of glass should be introduced, as ebullition takes place under the usual boiling point when these are present. In most pharmaceutical works directions are given to *completely* saturate the water with sugar, so that the sirup shall have the sp. gr. 1·321 when cold; but I find, from extensive experience in the manufacture of sirups, both in England and abroad, that, under all ordinary circumstances, a sirup with a *very slight excess* of water keeps better than one fully saturated. In the latter case, a portion of sugar generally crystallizes out on standing, and thus, by abstracting sugar from the remainder of the sirup, so weakens it that it rapidly ferments and spoils. This change proceeds at a rapidity proportionate to the temperature. Saturated sirup kept in a vessel that is frequently uncorked or exposed to the air, loses sufficient water by evaporation from its surface to cause the formation of minute crystals of sugar, which, falling to the bottom of the vessel, continue to increase in size at the expense of the sugar in solution. I have seen a single six-gallon stone bottle, in which sirup has been kept for some time, the inside of which, when broken, has been found to be entirely cased with sugar-candy, amounting to 16 or 18 lbs. On the other hand, sirups containing too much water also rapidly ferment, and become ascescent; but of the two, this is the less evil, and may be more easily prevented. The proportions of sugar and water given above will form an excellent sirup, provided care be taken to allow but little to be lost by evaporation. To make transparent sirups, the sugar should be in a single lump, and by preference taken from the bottom or broad end of the loaf, as, if powdered or bruised, the sirup will be cloudy. Sirups are judged to be sufficiently boiled when some taken up in a spoon pours out like oil; and when a thin skim appears on blowing upon the sirup, it is judged to be completely saturated. A fluid ounce of saturated sirup weighs 577½ grs., and a gallon 13⅕ lbs., (avoird.;) its sp. gr. is 1·320, or 35° of Baume's areometer; its boiling point is 221° F., and its density at the temperature of 212° is equal to 1·260, or 30° B. The sirups prepared with the juices of fruits, or that contain much extractive matter, as those of sarsaparilla, poppies, &c., should be made to mark about 2° or 3° more on Baume's scale than the other sirups.

*** The decimal part of the number denoting the specific gravity of a sirup, multiplied by 26, gives the number of pounds of sugar it contains per gallon very nearly. (Ure.) In boiling sirups, if they appear likely to boil over, a little oil, or

rubbing the edges of the pan with soap, will prevent it.

Pres. Sirups, as well as all saccharine solutions, should be kept in a cool place. "Let sirups be kept in a situation where the temperature never rises above 55°." (P. L.) The best plan is to keep them in *small*, rather than in *large* bottles, as the longer a bottle lasts, the more frequently it will be opened, and consequently the more exposed it will be to the air. By bottling sirups while boiling hot, and immediately corking down, and tying the bottles over with bladders perfectly air-tight, they may be kept, even at a summer heat, for years without fermenting. A certain wholesale drug house, remarkable for the quality of their sirups, adopt this method, employing thick green glass bottles for quantities of 2 quarts and under, and stoneware bottles for larger quantities. Each bottle is labelled with the name of the sirup, and the date at which it was made. On lately examining the stock of the parties alluded to, I observed some that had been bottled upwards of two years, and which still preserved its transparency and usual appearance. The addition of a little citric or tartaric acid (ʒij to ʒiv to the gallon) will prevent sirup candying, unless it be boiled too thick; and a little sulphite of potassa or lime will effectually prevent fermentation; but the two must not be used together. The one method is applicable to saturated or nearly saturated sirups; the other to those that are scarcely saturated with sugar, and which cannot be preserved in a cool situation. Chlorate of potash has also been proposed on theoretical grounds to prevent the access of the vinous fermentation, and I am told that its application is advantageous.

SIRUP OF BUCKTHORN. *Syn.* Syrupus Rhamni, (P. L. E. and D.) Syr. Spinæ Cervinæ. *Prep.*—1. (P. L.) Juice of buckthorn, defecated, 2 quarts; ginger and allspice, bruised, of each ʒvj; macerate the spice in 1 pint of the juice at a gentle heat for 4 hours, and filter; boil the rest to 1½ pints, mix the liquors, and dissolve therein white sugar lb. iv.—2. (*Wholesale.*)—*a.* Buckthorn juice 3 gallons; bruised pimento and ginger, sifted from the dust, of each ½ lb.; simmer for 15 minutes, strain, and add sugar 44 lbs.—*b.* Buckthorn juice 3 gallons; boil to 2 gallons, add bruised pimento and ginger gruffs, free from dust, of each ¾ lb.; boil to 1 gallon, strain, add molasses 72 lbs.; and finish the boiling. Cathartic. *Dose.* ½ oz. to 1 oz. *** Should the color be dull, the addition of a few grains of tartaric acid will brighten it.

SIRUP OF CAPILLAIRE. *Syn.* Sirup of Maidenhair. Syrupus capillorum Veneris. Sirop de Capillaire. *Prep.* Maidenhair ℥v; liquorice root ℥ij; boiling water lb. vj; steep for 6 hours, strain, and add white sugar q. s. (See Capillaire.)

SIRUP OF COCHINEAL. *Syn.* Syrupus Coccinellæ. *Prep.* Powdered cochineal ʒj; water 1¼ pints; boil to a pint, filter, and add white sugar 2 lbs. 1 oz. *Used* as coloring sirup, and often sold for sirup of clovepinks.

SIRUP OF COLTSFOOT. *Syn.* Syrupus Tussilaginis. *Prep.* (P. Cod.) Flowers of coltsfoot lb. j; (or dried flowers ℥ij;) boiling water lb. ij; macerate 12 hours; strain, press, filter, and add sugar lb. iv. A popular remedy in coughs, cold, &c. *Dose.* 1 to 2 tablespoonfuls ad libitum.

SIRUP EMPYREUMATIC. *Syn.* Syrupus Empyreumaticus. Fæx Sacchari. Treacle. Molasses.

SIRUP OF GUM. *Syn.* Syrupus Acaciæ. Syrop de Gomme. *Prep.* (P. Cod.) Dissolve pale and picked gum arabic in an equal weight of water by a gentle heat, and add the solution to twice its weight of simple sirup, simmer for 2 or 3 minutes, remove the scum, and cool. A pleasant demulcent. The addition of 1 or 2 oz. of orange-flower water to each pint, renders it very agreeable.

SIRUP OF GINGER. *Syn.* Syrupus Zingiberis, (P. L. E. and D.) *Prep* (P. L.) Bruised ginger ℥iiss; boiling water 1 pint; macerate for 4 hours, strain, and add white sugar lb. iiss. *Used* as a flavoring.

SIRUP OF HOREHOUND. *Syn.* Syrupus Marubii. Syrop de Prassio. *Prep.*—1. (P. Cod.) Dried horehound ℥j; horehound water lb. ij; digest in a water-bath for 2 hours, strain, and add white sugar lb. iv.—White horehound (fresh) 1 lb.; boiling water 1 gallon; infuse for 2 hours, press out the liquor, filter, and add sugar q. s. A popular remedy in coughs and diseases of the lungs. *Dose.* A tablespoonful ad libitum. "It is sold for any sirup of herbs that is demanded, and which is not in the shop." (Gray.)

SIRUP OF IODIDE OF IRON. *Syn.* Syrupus Ferri Iodidi. *Prep.*—1. (P. E.) Dry iodine 200 grs.; fine iron wire 100 grs.; water f℥vj; mix in a flask and boil, at first gently, and afterwards briskly, till reduced to two-thirds; filter while hot into a matrass containing white sugar ℥ivss; dissolve, and add water if necessary to make the whole measure exactly f ℥vj. ♏xij contain 1 gr. of iodide of iron.—2. (A. T. Thomson.) Contains 24 grs. of dry or 32 grs. of hydrated iodide of iron in each oz.—3. (Ricord.) 2 grs. to the oz. *** Either of the last two may be made from the former by adding simple sirup.—4. (*Wholesale.*) Dry iodine 6 oz.; iron filings 3 oz.; boiling water 2½ lbs.; sugar 5¼ lbs.; mix as No. 1, and make it up to 8¼ lbs. This is of the strength recommended by Dr. A. T. Thomson. *Dose.* Of either (except the third) ʒss to ʒj, as a tonic and resolvent, in debility, scrofula, &c. *** It should be perfectly transparent and colorless, or at most only of a very pale green tint, and should be without sediment even when exposed to the air. (P. E.) It keeps best in well-closed bottles, excluded from the light. (See Iodide of Iron.)

SIRUP OF IPECACUANHA. *Syn.* Syrupus Ipecacuanhæ. *Prep.* (P. E.) Coarsely-powdered ipecacuanha ℥iv; rectified spirit 1 pint; digest 24 hours, strain, add proof spirit f ℥xiv; again digest and strain, and repeat the process with water f ℥xiv; distil off the spirit from the mixed liquors, evaporate to f ℥xij; filter, add rectified spirit f ℥v, and simple sirup 7 pints; mix well. *Dose.* As an emetic for *infants* ½ teaspoonful; for *adults* 1 to 1½ oz.; as an *expectorant*, 1 to 3 teaspoonfuls.

SIRUP OF LEMONS. *Syn.* Syrupus Limonum, (P. L. E. and D.) *Prep.* (P. L.) Lemon juice (strained or defecated) 1 pint: sugar lb. iiss; dissolve by a gentle heat, and set it aside; in 24 hours remove the scum, and decant the clear. A pleasant refrigerant sirup in fevers, &c. *Dose.* 1 to 4 drs. in any diluent. With water it forms an extemporaneous lemonade.

SIRUP OF MARSHMALLOW. *Syn.* SYR-
)PUS ALTHÆÆ, (P. L. E. and D.) *Prep.* (P. L.) Marshmallow root, fresh and sliced, ℥viij; boiling vater 2 quarts; boil to one-half, set aside for 24 tours, decant the clear, add white sugar lb. iiss, and gently evaporate to a proper consistence. Demulcent and pectoral. *Dose.* 1 to 4 drs., in coughs, &c., added to mixtures.

SIRUP OF MULBERRIES. *Syn.* SYRUPUS MORI. *Prep.* (P. L.) Juice of mulberries, strained, pint; sugar lb. iiss; dissolve. *Used* as a coloring and flavoring where alkalis and earths are not present. Sirup of red poppies, (Rhœados,) slightly acidulated with tartaric or dilute sulphuric acid, is very generally sold for it.

SIRUP OF ORANGE-PEEL. *Syn.* SYRUPUS AURANTII, (P. L. E. D.) *Prep.*—1. (P. L.) Fresh orange-peel ℥iiss; boiling water 1 pint; macerate for 12 hours in a covered vessel, strain, and add sugar lb. iij.—2. (*Wholesale.*) *a.* Fresh orange-peel 8 oz., (or dried ¾ lb.;) sugar 18 lbs.; water q. s.—*b.* Tincture of orange-peel f℥j; simple sirup f℥xix; mix. As an agreeable flavoring and stomachic. *Dose.* 1 to 4 drs.

SIRUP OF POPPIES. *Syn.* SIRUP OF WHITE POPPIES. SYRUPUS PAPAVERIS, (P. L. E. & D.) DO. DO. ALBI. SYR. DE MECONIO. DIACODION. *Prep.* 1. (P. L.) Poppy heads, dried, bruised, and without the seeds, lb. iij; water 5 gallons; boil to 2 gallons, press out the liquor, boil to 2 quarts, set it aside for 12 hours, decant, strain, boil to 1 quart, and add sugar lb. v.—2. (*Wholesale.*) Extract of poppies 1½ lbs.; boiling water 2¾ gallons; dissolve, clarify, or filter, so that it may be perfectly transparent when cold, then add white sugar 44 lbs. and dissolve. Anodyne and soporific. *Dose.* For an *infant* ¼ to ½ teaspoonful; for an adult 2 to 4 drs.

SIRUP OF RED POPPIES. *Syn.* SIRUP OF CORN POPPY. SYRUPUS RHŒADOS, (P. L. E. & D.) *Prep.* (P. L.) Petals of the red poppy lb. j; boiling water 1 pint; mix in a water bath, remove the vessel, macerate for 12 hours, press out the liquor, and after defecation or filtering, add sugar lb. iiss.—2. (*Wholesale.*) Dried red poppy petals 3 lbs.; boiling water q. s.; white sugar 44 lbs.; as last. Employed as a coloring. A little acid brightens it. *** The color of this sirup is injured by contact with iron or copper.

SIRUP OF RHUBARB. *Syn.* SYRUPUS RHÆI. *Prep.*—1. (P. Cod.) Bruised rhubarb ℥iij; water ℥xvj; macerate 12 hours, filter, and add white sugar ℥xxxij.—2. (*Wholesale.*) Bruised rhubarb 1¾ lbs.; water q. s.; sugar 20 lbs.; as last. Stomachic and purgative.

SIRUP OF ROSES. *Syn.* SYRUPUS ROSÆ. (P. L. & D.) SYR. ROSÆ CENTIFOLIÆ, (P. E.) *Prep.* —1. (P. L.) Dried petals of red roses (*Rosa centifolia*) ℥vij; boiling water 3 pints; macerate for 12 hours, filter, evaporate in a water bath to 1 quart, and add white sugar lb. vj.—2. (*Wholesale.*) Rose leaves 1 lb.; sugar 19 lbs.; water q. s.; as last. Gently laxative. *Dose.* ½ to 1 oz. It is usual to add a few drops of dilute sulphuric acid to brighten the color. Alkalis turn it green.

SIRUP OF RUE. *Syn.* SYRUPUS RUTÆ. *Prep.* Oil of rue 12 drops; rectified spirit f℥ss; dissolve, and add simple sirup 1 pint. *Dose.* ½ to 2 teaspoonfuls in the flatulent colic of children

SIRUP OF SAFFRON. *Syn.* SYRUPUS CROCI, (P. L. & E.) *Prep.* 1. (P. L.) Hay saffron ʒx; boiling water 1 pint; macerate 12 hours, strain, and add sugar lb. iij.—2. (*Wholesale.*) Hay saffron 6 oz.; boiling water 6 quarts; white sugar 24 lbs.; as last. *Used* for its color and flavor.

SIRUP OF SARSAPARILLA. *Syn.* SYRUPUS SARZÆ, (P. L. & E.) SYR. SARSAPARILLÆ, (P. D.) *Prep.*—1. (P. L.) Sarsaparilla, sliced, ℥xv; boiling water 1 gallon; macerate for 24 hours, boil to 2 quarts, strain, add sugar ℥xv, and boil to a sirup. —2. (*Wholesale.*) Extract of sarsaparilla 3 lbs.; boiling water 3 quarts; dissolve, strain, and add white sugar 12 lbs. Alterative and tonic. *Dose* 2 to 4 drs.

SIRUP OF SARSAPARILLA, (COMPOUND.) *Syn.* SYRUPUS SARZÆ COMPOSITUS. SYROP DE CUSINIER. *Prep.* (P. U. S.) Sarsaparilla, bruised, lb. ij.; guaiacum wood, rasped, ℥iij; red roses, senna, and liquorice-root bruised, of each ℥ij; diluted alcohol 10 pints, (wine measure;) macerate for 14 days, express, filter through paper, and evaporate in a water bath to 4½ pints; then add sugar lb. viij, and when cold oils of sassafras and aniseed, of each 5 drops, and oil of partridge berry (gualtheria procumbens) 3 drops, previously triturated with a little of the sirup. An excellent preparation. *Dose.* f℥ss, 3 or 4 times a day, as an alterative, tonic, and restorative. *** The sirup of the P. Cod. is made with water instead of spirit, and is vastly inferior as a remedy.

SIRUP OF SENNA. *Syn.* SYRUPUS SENNÆ, (P. L. & E.) *Prep.*—1. (P. L.) Senna ℥iiss; bruised fennel seed ʒx; boiling water 1 pint; macerate with a gentle heat for 1 hour, strain, add manna ℥iij; white sugar ℥xv, and evaporate to a proper consistence.—2. (*Wholesale.*) The manna is usually omitted.—3. (P. E.) Senna ℥iv; boiling water f℥xxiv; strain, add treacle ℥xlviii, and evaporate to a proper consistence. Cathartic. *Dose.* 1 to 4 drs.

SIRUP, SIMPLE. *Syn.* SYRUPUS, (P. L.) SYRUPUS SIMPLEX, (P. E. & D.) *Prep.*—1. (P. L.) White sugar lb. x; water 3 pints; dissolve.—2. (*Wholesale.*) Double refined sugar 44 lbs.; distilled water 2¾ gallons; make a sirup. It should be as transparent as water. *Used* as a flavoring, and to give cohesiveness and consistence to pulverulent substances in the preparation of electuaries, pills, &c. (See CAPILLAIRE, and the introductory remarks on SIRUP.)

SIRUP OF SQUILLS. *Syn.* SYRUPUS SCILLÆ. *Prep.*—1. (P. E.) Vinegar of squills 3 pints; white sugar lb. vij; dissolve by a gentle heat.—2. (*Wholesale.*) Vinegar of squills 14 lbs., (*perfectly transparent;*) double refined sugar 28 lbs.; dissolve in a stoneware vessel in the cold, or at most by a very gentle heat. It should be as clear as water, and nearly colorless. *Dose.* 1 to 2 drs., as an expectorant in chronic coughs and asthma. In large doses it proves emetic.

SIRUP OF TOLU. *Syn.* BALSAMIC SIRUP. SYRUPUS TOLUTANUS, (P. L. & E.) SYR. BALSAMI TOLUTANI, (P. D.) *Prep.*—1. (P. L.) Balsam of Tolu ʒx; boiling water 1 pint; boil in a covered vessel for ½ an hour, frequently stirring, cool, strain, and add sugar lb. iiss.—2. (P. E.) Simple sirup (warm) lb. ij; tincture of Tolu ℥j; mix well together in a close vessel.—3. (*Wholesale.*) Warm

water 23 lbs; add tincture of Tolu, gradually, until it will bear no more without becoming opaque, constantly shaking the bottle, cork down and occasionally agitate till cold; filter through paper, add double refined sugar 44 lbs.; and dissolve in a close vessel, by a gentle heat in a water bath. This sirup should be clear and colorless as water, but as met with in the shops it is usually milky. Pectoral. *Dose.* 1 to 4 drs. in mixtures.

SIRUP, VELNO'S VEGETABLE. According to Dr. Paris and Sir B. Brodie, this celebrated nostrum is prepared as follows:—Young and fresh burdock root, sliced ℥ij; dandelion root ℥j; fresh spearmint, senna, coriander seed, and bruised liquorice root, of each ʒiss; water $1\frac{1}{2}$ pints; boil down gently to a pint, strain, add lump sugar 1 lb., boil to a sirup, and add a *small* quantity of corrosive sublimate, previously dissolved in a little spirit. *Used* as an alterative and purifier of the blood.

SIRUP OF VINEGAR. *Syn.* Syrupus Aceti. *Prep.* (P. E.) Vinegar (French wine) f℥xj; white sugar ℥xiv; make a sirup. *Dose* 1 dr. to 1 oz. as an expectorant in coughs and colds, or diffused through any mild diluent, as a drink in fevers.

SIRUP OF VIOLETS. *Syn.* Syrupus Violæ. (P. E. & D.) Syr. Violarum. *Prep.*—1. (P. E.) Fresh violets 1 lb.; boiling water $2\frac{1}{2}$ pints; infuse for 24 hours in a covered vessel of glass or earthenware, strain off the liquor, (with gentle pressure,) filter, add white sugar lb. viiss, and dissolve.—2. (*Wholesale.*) Double-refined white sugar 66 lbs.; anthokyan* 11 lbs.; water 22 lbs. or q. s.; dissolve in earthenware. Gently laxative. *Dose.* A teaspoonful for an infant. *** Genuine sirup of violets should have a lively violet blue color, and should be *reddened* by acids and turned *green* by alkalis, and should smell and taste of the flowers. It is frequently used as a test. A spurious sort is met with in the shops, which is colored by litmus, and slightly scented by orris root. The *purest* sugar, perfectly free from either acid or alkaline contamination, should alone be used in its manufacture. The P. E. orders the infusion to be strained without pressure, and the P. Cod. and other Ph. direct the flowers to be first washed in cold water.

SIZE. Obtained like glue from the skins of animals, but is evaporated less, and kept in the soft state.

SMALTS. *Syn.* Powder Blue. Smaltá. Azurum. *Prep.* I. Roast cobalt ore to drive off the arsenic, make the residuum into a paste with oil of vitriol, and heat it to redness for an hour; powder, dissolve in water, and precipitate the oxide of iron by carbonate of potash, gradually added, until a rose colored powder begins to fall, then decant the clear, and precipitate by a solution of silicate of potash prepared by fusing together for 5 hours a mixture of ten parts of potash, 15 parts of finely-ground flints, and 1 part of charcoal. The precipitate, after being dried, may be fused and powdered. Very fine.

II. Roasted cobalt ore and potash, of each 1 part; silicious sand 3 parts; fuse together, cool, and powder. Used in painting, to color glass, and to get up linen.

* The expressed juice of violets, defecated, gently heated in earthenware to 192°, skimmed cooled, filtered, a *little* spirit added, and again filtered.

SNUFF. *Syn.* Tabac, (*en poudre*, Fr.) The finer kinds of snuff are made from the best description of tobacco, separated from the damaged leaves; but the ordinary snuffs of the shops are mostly prepared from the coarser and damaged portions, the stems or stalky parts that remain from the manufacture of shag tobacco, the dust or powder sifted from the bales, and the fragments that are unfit for other purposes. To impart to the dried leaves the characteristic odor and flavor of tobacco, and to render them agreeable to "smokers" and "snuffers," it is necessary that they should undergo a certain preparation, or kind of fermentation. If a fresh green leaf of tobacco be crushed between the fingers, it emits merely the herbaceous smell common to most plants; but if it be triturated in a mortar along with a very small quantity of quicklime or caustic alkali, it will immediately exhale the peculiar odor of manufactured tobacco. This arises from the active and volatile ingredients being liberated from their previous combination, by the ammonia developed by fermentation, or the action of a stronger base. Tobacco contains a considerable quantity of muriate of ammonia, and this substance, as is well known, when placed in contact with lime or potassa, immediately evolves free ammonia. If we reverse the case, and saturate the excess of alkali in prepared tobacco by the addition of any mild acid, its characteristic odor will entirely disappear. In the preparation of tobacco previously to its manufacture into snuff, these changes are effected by a species of fermentation. The tobacco, either unprepared or cut into pieces, is placed in layers or heaps, and sprinkled with a weak solution of common salt and water, (about the sp. gr. 1·107,) or *sauce* as it is called; the salt being added to prevent the tobacco becoming mouldy, and to keep it moist, as well as to moderate the fermentation. Molasses is also frequently added to the sauce when a violet or dark-colored snuff is desired, and some persons with a like intention add a decoction or solution of extract of liquorice. I am informed, however, that pure water, without any addition, is quite sufficient to promote and maintain the perfect fermentation of tobacco, and that of late years the larger and more respectable houses have employed nothing else. The leaves soon become hot, and evolve ammonia; during this time the heaps require to be occasionally opened up and turned over, lest they become too hot, take fire, or run into the putrefactive fermentation. The extent to which the process is allowed to proceed varies with different kinds of snuff, from *one* to *three* months. When the leaves have arrived at the proper state, they are sufficiently dried to bear being pulverized. This is either performed in a mill, or with a kind of pestle and mortar. While powdering, the tobacco should be frequently sifted, that it may not be reduced to too fine a powder, and it should be moistened with rose or orange-flower water, or eau d'ange, which are the only waters fit for the superior kinds of snuff. This moistening is usually repeated several times. Tonca beans are put into snuff-boxes to scent the snuff, but the concentrated essence of tonca beans is now mostly used; the leaves of orchis fusca, and those of several other species of orchides that have the scent of the tonca bean, are also used to scent snuff. French snuff

s scented with the root of calamus aromaticus. During the grinding of tobacco it is but too frequently mixed with dark-colored rotten wood, various English leaves, coloring and other matter, which substances are added by the fraudulent manufacturer to reduce the cost. It is a general practice with many dealers to add ammonia to their snuffs to increase their pungency. I have seen 1 cwt. of powdered sal ammoniac sent at one time to a certain London tobacconist. Powdered glass and hellebore are also frequently added for a like purpose. The moist kinds of snuff are generally drugged with pearlash, for the triple purpose of keeping them moist and increasing their pungency and color. The dry snuffs, especially *Welsh*, are commonly adulterated with quicklime, the particles of which may often be distinguished by the naked eye. This addition causes its biting and desiccating effect on the pituitary membrane. *Scotch*, *Irish*, *Welsh*, and *Spanish snuffs*, *Lundyfoot*, *&c.*, are examples of the DRY SNUFFS. Among MOIST SNUFFS or RAPPEES, *brown black*, *Cuba*, *carotte*, *&c.*, may be mentioned. *Hardham's mixture, No.* 37, is a mixed rappee, and *Prince's mixture*, *princeza*, *&c.*, are scented rappees. The *Scotch*, *Irish*, and in fact most of the ordinary snuffs of the shops, are prepared from the midribs and waste pieces; but the *Strasburgh*, *French*, *Russian*, and *Macouba snuffs*, from the soft parts of the leaves. The immense variety of snuffs kept in the shops, depend for their distinguishing characteristics on the length of the fermentation, the fineness of the powder, the height to which they are dried, and the addition of odorous substances. Among some of the most esteemed French snuffs are the following:—*Tabac de cedrat*, *bergamotte*, and *neroli*, are made by adding the essences to the snuff.—*Tabac parfumée aux fleurs*, by putting orange flowers, jasmins, tuberoses, musk-roses, or common roses, to the snuff in a close chest or jar, sifting them out after 24 hours, and repeating the infusion with fresh flowers as necessary. Another way is to lay paper pricked all over with a large pin between the flowers and the snuff.—*Tabac musquée.* Any scented snuff 1 lb.; musk (ground to a powder with white sugar and moistened with ammonia water) 20 grs.; mix.—*Tabac ambre.* Tabac aux fleurs 1 lb.; ambergris powdered as last 24 grs.—*Tabac en odeur de Malthe.* Tabac de nerole 1 lb.; ambergris 20 grs.; civette 10 grs.; sugar q. s.—*Tabac à la sainte d'Espagne.* Snuff aux fleurs 1 lb.; musk 10 grs.; civette 6 grs.; sugar q. s.—*Tabac en odeur de Rome.* Snuff aux fleurs 1 lb.; ambergris 20 grs.; musk 6 grs.; civette 5 grs.; sugar q. s.—*Tabac de Pongibou.* Yellow snuff scented with orange flowers 1 lb.; civette 12 grs.; sugar q. s.; essence of orange flowers 2 to 4 drs.; other essences may be used, the snuff having been previously scented with the same flowers.—*Tabac fin façon d'Espagne.* Red snuff perfumed with flowers.—*Macouba snuff* is imitated by moistening the tobacco with a mixture of treacle and water, and allowing it to ferment well.—*Spanish snuff.* Unsifted Havannah snuff ground and reduced by adding ground Spanish nut-shells, sprinkling the mixture with treacle water, and allowing it to sweat for some days before packing. Most of the imitations of foreign snuff require to be well packed to give them a good appearance.—*Yellow snuff.* Yellow ochre the size of an egg, add chalk to lower the color, grind with 4 drs. of oil of almonds till fine, then add water by degrees, and 2 spoonfuls of mucilage of tragacanth, till you have about a quart; mix this with purified snuff q. s. and dry it; then grind some gum tragac. with some scented water, and moisten your snuff with it, and when dry, with a very fine sieve sift out the color that does not adhere to the snuff.—*Red Snuff.* As last, but use red ochre.—*Eye Snuff.* Subsulphate of mercury ½ dr.; dry Scotch snuff or Lundyfoot 1 oz.; triturate well together. A pinch of this occasionally, in inflammation of the eyes, dimness of sight, headache, &c.

SOAP. *Syn.* SAVON, (*Fr.*) SEIFE, (*Ger.*) SAPO, (*Lat.*) *Spanish* or *Castile* soap, made with olive oil and soda, (*Sapo. Sapo ex olivæ oleo et sodâ confectus*, P. L.,) and *soft soap* made with olive oil and potash, (*sapo mollis*, *sapo ex olivæ oleo, et potassâ confectus*, P. L.,) are the only kinds directed to be employed in medicine. The former is intended whenever *soap* is ordered, and is the only one employed internally; the latter is used in ointments, &c.

CASTILE SOAP, (*Spanish soap. Marseilles do. Sapo. Sapo durus. Sapo Hispanicus.*) *Olive oil soda soap* is kept both in the *white* and *marbled* state; the former is the purest, but the latter is the strongest.

ALMOND SOAP (*Sapo Amygdalinus*) is made from almond oil and caustic soda, and is chiefly used for the toilet.

CURD SOAP is made with tallow and soda.

MOTTLED SOAP with refuse kitchen-stuff, &c.

YELLOW SOAP (*Rosin soap*) with tallow, rosin, and caustic soda.

SOFT SOAP (of commerce) with whale, seal, or cod oil, tallow, and potash. The olive oil soft soap of the Pharmacopœia is not met with in trade.

SOAP A LA ROSE. *Prep.* New olive oil soap 30 lbs.; new tallow soap 20 lbs.; reduce them to shavings by sliding the bars along the face of an inverted plane, melt in an untinned copper pan by the heat of steam or a water-bath, add 1½ oz. of finely-ground vermilion, mix well, remove the heat, and when the mass has cooled a little, add essence of roses (otto?) 3 oz.; do. of cloves and cinnamon, of each 1 oz.; bergamotte 2½ oz.; mix well, run the liquid mass through a tammy cloth, and put it into the frames. If the soaps employed are not new, 1 or 2 quarts of water must be added to make them melt easily. Very fine.

SOAP AU BOUQUET. *Prep.* Best tallow soap 30 lbs.; essence of bergamotte 4 oz.; oils of cloves, sassafras, and thyme, of each 1 oz.; pure neroli ½ oz.; finely-powdered brown ochre 7 oz.; mix as last. Very fine.

SOAP, BITTER ALMOND. *Prep.* Best white tallow soap ½ cwt.; essence of bitter almonds 10 oz.; as soap à la rose. Very fine.

SOAP, BLACK. *Syn.* SAPO NIGER. This is properly a crude soft soap made of fresh oil, tallow, and potash; but the following mixture is usually sold for it:—soft soap 7 lbs.; train oil 1 lb.; water 1 gallon; boil to a proper consistence, adding ivory black or powdered charcoal to color. *Used* by farriers.

SOAP, CINNAMON. *Prep.* Best tallow soap 30 lbs.; do. palm oil soap 20 lbs.; essence of cinnamon 7 oz.; do. of sassafras and bergamotte, of each 1¼ oz.; finely powdered yellow ochre, 1 lb.; mix as soap à la rose. Very fine.

SOAP, CROTON. *Syn.* SAPO CROTONIS. *Prep.* Croton oil ℨj; liquor of potassa ℨss; triturate together. Purgative. *Dose.* 2 to 3 grs.

SOAP, FLOATING. *Prep.* Good oil soap ½ cwt.; water ½ gallon; melt by the heat of a steam or water bath in a pan furnished with an *agitator*, which must be assiduously worked till the soap has at *least* doubled its volume, when it must be put into the frames, cooled, and cut into pieces. Lathers well and is very pleasant. Any scent may be added.

SOAP, MACQUER'S ACID. *Syn.* SAPO VITRIOLICUS. *Prep.* Castile soap 4 oz.; soften by heat and a little water; add oil of vitriol q. s., continually triturating the mass in a mortar. Detergent. *Used* where alkalis would be prejudicial.

SOAP, MUSK. *Prep.* Best tallow soap 30 lbs.; palm oil soap 20 lbs.; powdered cloves, pale roses, and gilliflowers, of each 4½ oz.; essences of bergamotte and musk, of each 3½ oz.; Spanish brown 4 oz.; mix as soap à la rose. Very fine.

SOAP, ORANGE-FLOWER. *Prep.* Best tallow soap 30 lbs.; palm oil soap 20 lbs.; essences of Portugal and ambergris, of each 7½ oz.; yellowish green color (ochre and indigo) 8¼ oz.; vermilion, 1¼ oz.; mix as soap à la rose. Very fine.

SOAP, PEARL SOFT. *Syn.* ALMOND CREAM. CREME D'AMANDES, *Prep.* Best hog's lard 20 lbs.; stir it assiduously in a water bath till it is only half melted, and has a thick creamy appearance, then add 5 lbs. of caustic potash lye at 36° B. and continue stirring at the same temperature till soapy granulations begin to fall to the bottom; then add 5 lbs. more of lye, and continue the stirring for 4 hours more, or till the mass becomes too stiff to be further stirred, when it must be gently beaten and allowed to cool very slowly. When quite cold it must be beaten in small portions at a time in a marble mortar, till it unites to form a homogeneous mass, or "*pearls*" as it is called; essence of bitter almonds q. s. to perfume being added during the pounding.

SOAP, PALM OIL. *Syn.* VIOLET SOAP. Made of palm oil and caustic soda lye. Has a pleasant odor of violets and a lively color.

SOAP, STARKEY'S. *Syn.* SAVON TEREBINTHINE. *Prep.* (P. Cod.) Warm subcarbonate of potash, oil of turpentine, and Venice turpentine, equal parts; triturate together with a little water till they combine; put it into paper moulds, and in a few days slice it and preserve it in a well stopped bottle.

SOAP, TRANSPARENT. *Prep.*—1. Perfectly dry tallow soap in shavings, and rectified spirit of wine, equal parts; put them into a still, apply a *very gentle* heat to effect the solution, allow the liquid to settle for 2 hours, then pour the clear portion into frames.—2. Dissolve dry almond or soft soap in spirit of wine, strain while warm, distil off the spirit, and pour into moulds. *** This soap does not acquire its full transparency till after a few weeks' exposure to a dry atmosphere: the pieces must then be trimmed up and stamped as desired. It may be scented and colored by adding the ingredients to it while soft. It is colored *rose* by tincture of archil, and *yellow* by tincture of turmeric. Does not lather well.

SOAP, WINDSOR. The best Windsor soap is made of a mixture of olive oil 1 part, and ox tallow or suet 9 parts, saponified by caustic soda; but most of the Windsor soap of the shops is merely ordinary curd soap scented. On the large scale the perfume is added while the soap is in the soft state, just before it is put into frames, but on the small scale it may be prepared in the same way as soap à la rose.

Prep.—1. Best beef tallow and oil soap, as above, 3 cwt.; essence of caraway 2 lbs.; English oil of lavender, and oil of rosemary, of each ½ lb.; mix as soap à la rose.—2. Hard curd soap 1 cwt.; oil of caraway 1½ lbs.; tincture of musk 12 oz.; English oil of lavender 2 oz.; oil of origanum ½ oz.; as last.—3. Curd soap melted and scented with the oils of caraway and bergamotte *** Brown Windsor soap is the same colored.

SOAPS, TOILET. I. (*Soft.*) The basis of these is a soap made of hog's lard and potash, variously scented and colored.—2. (*Hard.*) The basis of these is a mixture of suet 9 parts, and olive oil 1 part, saponified by caustic soda, and variously scented and colored. They are also made of white tallow, olive, almond, and palm oil soaps, either alone or combined in various proportions, and scented.

SODA. *Syn.* OXIDE OF SODIUM. SOUDE, (*Fr.*) NATRON, (*Ger.*) The hydrate of soda, (*Sodæ Hydras,*) as well as its solution, (*Liquor Sodæ,*) are prepared from carbonate of soda in the same way as the corresponding preparations of potassa. The majority of its salts may also be obtained in a similar manner to those of potassa.

Prop., Tests, &c. Pure soda resembles potassa, but possesses rather less powerful basic and alkaline properties. *Soda and its salts are recognised.*—1. By their solubility in water, and not being precipitated by any reagent.—2. By yielding a salt with sulphuric acid, which by its taste and form is readily recognised as sulphate of soda.—3. By its salts, when exposed by means of platinum wire to the blowpipe flame, imparting a rich yellow color.—4. A solution of caustic soda or carbonate of soda turns turmeric brown and vegetable blues green.—5. Its muriate imparts a yellow tinge to the flame of alcohol.

SODA, ACETATE. *Syn.* SODÆ ACETAS. (P. L. & D.) TERRA FOLIATA MINERALIS. *Prep.* (P. D.) Saturate dilute acetic acid with carbonate of soda, filter, and evaporate to the density of 1·276; dry the crystals deposited as the liquid cools, and keep them from the air. *Dose.* 1 to 2 drs. as a diuretic; chiefly used to make acetic acid.

SODA, PHOSPHATE OF. *Syn.* TASTELESS PURGING SALTS. TRIBASIC PHOSPHATE OF SODA AND BASIC WATER. RHOMBIC PHOSPHATE OF SODA. NEUTRAL DO. SAL MIRABILE PERLATUM. SODA PHOSPHORATA. SODÆ PHOSPHAS, (P. L. E. & D.) *Prep.* (P. E.) Powdered bone ashes lb. x, sulphuric acid 2 pints and f℥iv; mix, add gradually water 6 pints, and digest for 3 days, replacing the water which evaporates; add 6 pints of boiling water and strain through linen, and wash the residue in the filter with boiling water; mix the liquors, and after defecation decant and evap-

erate to 6 pints; let the impurities again settle and neutralize the clear fluid, heated to boiling, with a solution of carbonate of soda in slight excess; crystals will be deposited as the solution cools, and by successively evaporating, adding a little soda to the mother liquor till it is feebly alkaline, and cooling, more crystals may be obtained. Keep it in closed vessels.

Remarks. "Exposed to the air it slightly effloresces. It is totally dissolved by water but not by alcohol." (P. L.)—"45 grs. dissolved in f℥ij of boiling water, and precipitated by a solution of 50 grs. of carbonate of lead in f℥j of pyroligneous acid, will remain precipitable by solution of acetate of lead." (P. E.) *Dose.* 6 to 12 drs. as a purgative in broth or soup. It has scarcely any taste.

SODA, POTASSIO-TARTRATE OF. *Syn.* Tartrate of Potash and Soda. Seignette's Salt. Rochelle do. Tartarized Soda. Sel de Seignette. Sal Rupellensis. Sal Polychrestum Seignetti. Soda Tartarizata Natron Tartarizatum. Potassæ et Sodæ Tartras, (P. E. & D.) Sodæ Potassio-tartras, (P. L.) *Prep.* (P. L.) Carbonate of soda ℥xij; boiling water 2 quarts; dissolve, and add, gradually, powdered bitartrate of potash ℥xvj; strain, evaporate to a pellicle, and set it aside to crystallize; dry the crystals and again evaporate the liquor that it may yield more crystals. *** Readily soluble in cold water. Sulphuric acid added to the solution throws down small crystals of bitartrate of potash. By heat it yields a mixture of the pure carbonates of potash and soda. It is a mild and cooling laxative. *Dose.* ½ to 1 oz. largely diluted with water. It forms the basis of the popular aperient called *Seidlitz Powders.*

SODA, SULPHATE OF. *Syn.* Glauber's Salt. Sal Glauberi. Sal Catharticus Glauberi. Sal Mirabile Glauberi. Natron Vitriolatum. Sodæ Sulphas, (P. L. E. & D.) *Prep.* (P. L.) Dissolve lb. ij of the salt left in distilling muriatic acid, in Oij of boiling water, saturate with carbonate of lime, evaporate and crystallize.

Remarks. Glauber salts effloresce when exposed to the air; are totally dissolved by water; very slightly so by alcohol; the solution is neutral to test paper; nitrate of silver throws down scarcely any thing from a dilute solution; nitrate of baryta more, which is not dissolved by nitric acid. It loses 55·5§ of its weight by a strong heat. (P. L.) *Dose.* ½ to 1 oz. as a purge. The dried salt (*Sodæ Sulphas Exsiccata*) is twice as strong. *** Sulphate of soda is also made in the same way from the residuum of the distillation of nitric acid from nitrate of soda, and of sal ammoniac from a mixture of sulphate of ammonia and common salt.—*Lymington Glauber Salts* is a mixture of the sulphate of soda and potash obtained from the mother liquor of sea-water.

SODIUM. *Syn.* Natrium, (*Ger.*) The metallic base of soda. It is a soft white metal, scarcely solid at common temperatures, fuses at 200° F., and volatilizes at a red heat, sp. gr. 0·972; its other properties resemble those of potassium; but are of a feebler character. It was first obtained by Sir H. Davy in 1807, by means of a powerful galvanic battery, but it may be more conveniently and cheaply procured in quantity, by the process described under Potassium. With oxygen it forms a *protoxide* (soda) and a *peroxide;* with chlorine, a *chloride,* (common salt;) and with bromine, iodine, fluorine, sulphur, &c., *bromide, iodide, fluoride, sulphuret, &c., of sodium,* —all of which may be obtained by similar processes to the respective compounds of potassium.

SODIUM, CHLORIDE OF. *Syn.* Muriate of Soda. Hydrochlorate of do. Salt. Common Salt. Sea do. Culinary do. Sodæ Murias, (P. E. & D.) Sodii Chloridum, (P. L.) This important and wholesome compound appears to have been known in the earliest ages of the world, of which we have any record. It is mentioned by Moses, (Gen. xix. 26,) and by Homer in the Iliad, (lib. ix. 214.) In ancient Rome it was subjected to a duty, (*vectigal salinarium.*) Common salt forms no small portion of the mineral wealth of England, and has become an important article of commerce. The principal portion of the salt consumed in this country is procured by the evaporation of the water of brine springs.

Rock Salt (*Fossil Salt, Sal Gemmæ, Sal Fossilis*) is found in mineral beds in Cheshire; it has commonly a reddish color, and is mostly exported for purification.—*Salt* is also prepared by the evaporation of sea water, (hence the term *sea salt,*) but this process has been almost abandoned in England, being more suited to hot dry climates, or very cold ones.

Bay Salt (*Sal marinus, Sal niger*) is imported from France, Portugal, and Spain, and is obtained from sea water evaporated in shallow ponds by the sun. It is large-grained and dark-colored.

Cheshire Stoved Salt, (*Lump Salt, Basket do.,*) is obtained by evaporating the brine of salt springs until reduced to a mass of small flaky crystals barely covered with liquor, when it is put into baskets and dried.

London's Patent Solid Salt, is Cheshire rock salt melted in a reverberatory furnace and ladled into moulds.

British Bay Salt (*Cheshire large-grained Salt*) is obtained by evaporating the brine at a heat of 130° to 140° F. Hard cubical crystals. Both the last are used to salt provisions for hot climates, as they dissolve very slowly in the brine as it grows weaker.

*** Common salt is stimulant and antiseptic, and is hence employed as a condiment, and for preserving animal and vegetable substances. It is also occasionally used in medicine, in clysters and lotions. For medical purposes the P. E. orders it to be dissolved in boiling water and the solution filtered and evaporated over the fire, skimming off the crystals as they form; they must be then quickly washed in cold water and dried. "A solution of *pure* salt is not precipitated by a solution of carbonate of ammonia, followed by solution of phosphate of soda: a solution of 9 grs. in distilled water is not entirely precipitated by a solution of 26 grs. of nitrate of silver." (P. E.)

SOIL. The earth in which vegetables grow. In cases where a barren soil is examined with a view to its improvement, it ought, if possible, to be compared with an extremely fertile soil in the same neighborhood, and in a similar situation: the difference given by their analyses would indicate the methods of cultivation, and thus the plan of improvement would be founded upon accurate

scientific principles. (See ABSORPTION, AGRICULTURE, FARMING, MANURES, &c.)

SOLANINE. *Syn.* SOLANINA. *Prep.* Filter the juice of nightshade berries, (*Solanum nigrum,*) quite ripe, add ammonia, filter, wash the sediment, boil in alcohol, filter, and distil off the spirit; the solanine is left as a white powder. Insoluble in water, bitter, emetic, narcotic, and poisonous. By careful crystallization in alcohol it forms needle-like crystals, resembling disulphate of quinine. It may also be obtained from the leaves and stem of solanum dulcamara, (*bitter-sweet.*) With the acids it forms salts, many of which are crystallizable.

SOLDER, FINE. *Prep.* Tin 2 parts, lead 1 part; melt together. Melts at 350°. *Used* to tin copper, solder tin plates, &c.

SOLDER, GLAZIER'S. *Prep.* Lead 3 parts; tin 1 part; melts at 500°.

SOLDER FOR TIN, (SMITH'S.) *Prep.* Lead and tin, of each, 4 oz.; bismuth 8 oz.; melts in boiling water.

SOLDERING. Tin-foil applied between the joints of fine brass work, first wetted with a strong solution of sal ammoniac, makes an excellent juncture, care being taken to avoid too much heat.

SOLOMON'S BALM OF GILEAD. *Prep.* Compound tincture of cardamoms, made with brandy instead of proof spirit, 1 pint; tincture of cantharides, P. L. f℥j; mix.

SOLUTION OF ALUM, (COMPOUND.) *Syn.* BATE'S ALUM WATER. AQUA ALUMINOSA. BATEANA. LIQUOR ALUMINIS COMPOSITUS. (P. L.) *Prep.* Alum and sulphate of zinc, of each, ℥j; boiling water 3 pints; dissolve, and filter if necessary. Detergent and astringent. *Used* as a lotion for old ulcer, chilblains, excoriation, &c.; and diluted with water, as an eye-wash and injection.

SOLUTION OF AMMONIA. *Syn.* LIQUOR AMMONIÆ; LIQ. AMMONIÆ FORTIOR, (P. L.) AQUA AMMONIÆ; DO. DO. FORTIOR, (P. E.) AQ. AMMON. CAUSTICÆ, (P. D.) The London College gives no formula for their stronger solution, though in the notes to the Ph. it is stated to have the sp. gr. 0·882.

SOLUTION OF ACETATE OF AMMONIA. *Syn.* LIQUOR AMMONIÆ ACETATIS, (P. L.) AMMONIÆ ACETATIS AQUA, (P. E. & D.)

SOLUTION OF SESQUICARBONATE OF AMMONIA. *Syn.* CARBONATE OF AMMONIA WATER. LIQUOR AMMONIÆ. SESQUICARBONATIS. (P. L.) AMMONIÆ CARBONATIS AQUA. (P. E. & D.) *Prep.*—1. (P. L.) Sesquicarbonate of ammonia ℥iv; distilled water 1 pint; dissolve and filter. Stimulant and antacid. *Dose.* f℈ss to f℈iss, in water.—2. (*Henry's.*) Made up to sp. gr. 1·046. Two measures are equal in saturating power to one of his carbonate of potash water. *Used* in analysis.

SOLUTION OF AMMONIO-NITRATE OF SILVER. *Syn.* HUME'S TEST. SOLUTIO ARGENTI AMMONIATI. *Prep.* (P. E.) Nitrate of silver (pure crystallized) 44 grains; distilled water f℥j; dissolve, and add ammonia water, gradually, till the precipitate, at first thrown down, is *very nearly,* but not *entirely,* redissolved. *Used* as a test for arsenious acid

SOLUTION OF AMMONIO-SULPHATE OF COPPER. *Syn.* BLUE EYE-WATER. AQUA SAPPHIRINA. SOLUTION OF AMMONIATED COPPER. LIQUOR CUPRI AMMONIO-SULPHATIS, (P. L.) SOLUTIO CUPRI AMMONIATI, (P. E.) AQUA DO. DO. (P. D.) *Prep.* (P. L.) Ammonio-sulphate of copper ℈j; water 1 pint; dissolve and filter. Stimulant and detergent. Applied to indolent ulcers, and when diluted, to remove specks on the cornea; also used as a test.

SOLUTION OF ARSENITE OF POTASSA. *Syn.* FOWLER'S SOLUTION. MINERAL DO. LIQUOR POTASSÆ ARSENITIS, (P. L.) LIQ. ARSENICALIS, (P. E. & D.) *Prep.* (P. L.) Arsenious acid, coarsely powdered, and carbonate of potash, of each, 80 grs.; distilled water 1 pint; boil till dissolved, add compound tincture of lavender f℈v, and water q. s. to make the whole *exactly* measure a pint. *Dose.* 4 to 5 drops, gradually and cautiously increased; in agues and several scaly skin diseases. (See ARSENIC.)

SOLUTION OF ARSENIOUS ACID. *Syn.* TASTELESS AGUE DROP. *Prep.* Arsenious acid 1 gr.; water f℥j; dissolve. *Dose.* 1 teaspoonful twice a day in ague. (See ARSENIC.)

SOLUTION OF BICHLORIDE OF MERCURY. *Syn.* SOLUTION OF CORROSIVE SUBLIMATE. LIQUOR HYDRARGYRI BICHLORIDI. *Prep.* (P. L.) Corrosive sublimate and sal ammoniac, of each, 10 grs.; water 1 pint; dissolve. *Dose.* ½ to 3 drs. in water. It also forms a most useful lotion in various skin diseases.

SOLUTION, BRANDISH'S ALKALINE. *Prep.* American pearlashes lb. vj; quicklime and woodashes, (from the ash,) of each, lb. ij; boiling water 6 gallons; slake the lime with a portion of the water, then add the remainder of the ingredients, agitate occasionally in a covered vessel for 1 hour, and after 24 hours' repose decant the clear. Resembles liquor of potassa P. L., but the strength is variable; the latter is almost always sold for it. It is largely asked for in trade. A drop or two of oil of juniper renders it more agreeable.

SOLUTION OF CARBONATE OF POTASH. *Syn.* SUBCARBONATE OF POTASH-WATER. OIL OF TARTAR. OLEUM TARTARI. AQUA KALI. LIQUOR POTASSÆ CARBONATIS, (P. L.) POTASSÆ CARBONATIS AQUA, (P. D.) *Prep.* Carbonate of potash ℥xx; water 1 gallon; dissolve and filter. Sp. gr. 1·473. *Dose.* 10 drops to 1 dr.; as an antacid, &c.

SOLUTION OF CHLORIDE OF BARIUM. *Syn.* LIQUOR BARII CHLORIDI, (P. L.) SOLUTIO BARYTÆ MURIATIS, (P. E.) AQUA DO. DO., (P. D.) *Prep.* Chloride of barium ℈j; water f℥j; dissolve. *Dose.* 10 drops gradually increased; in scrofula, scirrhous affections, and worms; also used as a test for sulphuric acid.

SOLUTION OF CHLORIDE OF CALCIUM. *Syn.* SOLUTION OF MURIATE OF LIME. LIQUOR CALCII CHLORIDI, (P. L.; SOLUTIO CALCIS MURIATIS, (P. E.) AQUA DO. DO., (P. D.) *Prep.* (P. L.) Fused chloride of calcium ℥iv; (crystals ℥viij, P. E.;) water f℥xij; dissolve and filter. *Dose.* 10 drops to 2 drs.; for scrofulous tumors, bronchocele, &c.; also used as a test for sulphuric acid.

SOLUTION OF CHLORIDE OF LIME

Syn. PURIFYING LIQUID. SOLUTION OF CHLORINATED LIME. SOL. OF HYPOCHLORITE OF DO. LIQUOR CALCIS CHLORINATÆ. *Prep.* Chloride of lime, dry and good, 9 lbs.; hot water 6 gallons; mix in a stoneware bottle, agitate frequently for 2 or 3 days, then decant the clear, and keep it in well-corked bottles. If filtered it should be done as rapidly as possible through coarsely-powdered glass in a covered vessel. This is the usual strength sold in trade. It is used as a disinfectant, and, diluted with water, as a lotion, injection, or collyrium, in several diseases. (See LIME, CHLORIDE OF.)

SOLUTION OF CHLORIDE OF POTASH. *Syn.* BLEACHING LIQUID. AQUA ALKALINA OXYMURIATICA. EAU DE JAVELLE. Prepared like solution of chlorinated soda, but employing carbonate of potash. *Use.* As the last.

SOLUTION OF CHLORIDE OF SODA. *Syn.* LABARRAQUE'S DISINFECTING LIQUID. LIQUEUR DE LABARRAQUE. CHLORIDE OF SODA. OXYMURIATE OF DO. CHLORURET OF OXIDE OF SODIUM. HYPOCHLORIS SODICUS AQUA SOLUTUS. (P. Cod.) SODÆ HYPOCHLORIS. LIQUOR SODÆ CHLORINATÆ. (P. L.) *Prep.* Carbonate of soda lb. j; water 1 quart; dissolve, and pass through the solution the chlorine evolved from a mixture of common salt ℥iv; binoxide of manganese ℥iij; sulphuric acid ℥iv; diluted with water ℥iij; placed in a retort; heat being applied to promote the action, and the gas being purified by passing through f℥v of water before it enters the alkaline solution. *Used* as an antiseptic, disinfectant, and bleaching liquid. *Dose.* 20 to 30 drops in any bland fluid, in scarlet fever, sore throat, &c.; it is also made into a lotion, gargle, injection, and eye-water. Meat in a nearly putrid state, unfit for food, is immediately restored by washing or immersion in this liquid.

SOLUTION OF DIACETATE OF LEAD. *Syn.* EXTRACT OF LEAD. GOULARD'S EXTRACT. EXT. OF SATURN. EXTRACTUM SATURNI. AQUA LYTHARGYRI ACETATI, (P. L. 1788.) LIQUOR PLUMBI ACETATIS, (P. L. 1809.) LIQ. PLUMBI SUBACETATIS, (P. L. 1824 & P. D.) LIQ. PLUMBI DIACETATIS, (P. L. 1836.) SOLUTIO DO. DO. (P. E.) LIQ. PLUMBI. *Prep.*—1. (P. L.) Acetate of lead ℥xxvij; litharge, in fine powder, ℥xvj; water 3 quarts; boil for ½ an hour, frequently stirring, and then add enough distilled water to make it measure 3 quarts; filter if required, and keep it in a closed vessel.—2. (*Wholesale.*) Finely-powdered litharge 32 lbs.; distilled vinegar 32 gallons; boil in a bright copper pan for 2 hours, cool, add water to make up 32 gallons, and decant.—3. (*Dilute Solution of Diacetate of Lead. Water of Saturn. Goulard's Lotion or Water. Goulard. Goulard's Vegeto-mineral Water. Liquor Plumbi Diacetatis Dilutus*, P. L. *Liquor Plumbi Subacetatis Compositus*, P. D.) *Prep.* (P. L.) Solution of diacetate of lead fʒiss; proof spirit fʒij; distilled water 1 pint; mix. *⁎* These preparations were formerly made with common vinegar, and hence were colored, but those of the Pharm. are white. If wanted colored, a little spirit coloring may be added. The formula No. 2 will take a quart. *Use.* The stronger liquor is only used diluted. The diluted solution (No. 3) is employed as a cooling, sedative, and astringent wash, in various affections.

SOLUTION, DONOVAN'S. *Syn.* SOLUTION OF HYDRIODATE OF ARSENIC AND MERCURY. LIQUOR HYDRIODATIS ARSENICI ET HYDRARGYRI. *Prep.*—1. (Mr. Donovan.) Triturate 6·08 grains of metallic arsenic, 15·38 grains of mercury, and 50 grains of iodine with fʒj of alcohol, till dry; mix with f℥viij of distilled water, put them into a flask, add ʒss of hydriodic acid, and boil a few moments. When cold, make it up f℥viij.—2. (*Wholesale.*) Metallic arsenic 61 grs.; iodine 500 grs.; mercury 154 grs.; rectified spirit fʒx; distilled water 2 quarts; hydriodic acid fʒv; as last. It must measure *exactly* f℥LXXX, or weigh 5 lbs. 1¼ oz. (av.) when cold.—3. (Soubeiran.) Iodide of arsenic 98 grs.; biniodide of mercury 90 grs.; moisten the two iodides with a little hot water, then pour on sufficient to dissolve them, filter, and add enough distilled water to make the whole weigh, when cold, *exactly* 10,000 grs., (equal to ℥xx ʒvj ℈ij, or 22¾ oz. and 47½ grs. avoird.) The last formula has the advantage of yielding a more certain product than the former, as when this liquor is prepared according to Mr. Donavan's directions, the whole of the arsenic is seldom dissolved, unless by the most careful trituration, besides which the process is very tedious. Soubeiran recommends the employment of 1 part each of the iodides, and 98 parts of water, as furnishing a simpler formula, the decimal parts of a grain not being very easily weighed; besides, these proportions are *almost* exactly those employed by Mr. Donovan. *Dose.* 10 drops to fʒss in lepra, psoriasis, lupus, and several other scaly skin diseases.

SOLUTION OF IODIDE OF POTASSIUM. *Syn.* LIQUOR POTASSII IODIDI COMPOSITUS. (P. L.) *Prep.* Iodide of potassium 10 grs.; iodine 5 grs.; water 1 pint; dissolve. *Dose.* 2 to 6 drs. in the usual cases where iodine is employed.

SOLUTION OF IODOHYDRARGYRATE OF IODIDE OF POTASSIUM. *Syn.* LIQUOR IODOHYDRARGYRATIS POTASSII IODIDI. *Prep.* (Puche.) Biniodide of mercury and iodide of potassium, of each 1 gr.; distilled water 1000 grs.; dissolve.

SOLUTION OF IRON, (*Alkaline.*) *Syn.* LIQUOR FERRI ALKALINI, (P. L. 1824.) *Prep.* Iron filings ʒiiss; nitric acid ℥ij; water f℥vj; dissolve, decant, and gradually add solution of carbonate of potash f℥vj. Tonic; emmenagogue. *Dose.* ½ to 1 dr.

SOLUTION OF LIME. *Syn.* LIME-WATER. LIQ. CALCIS HYDRATIS. SOLUTIO CALCIS. LIQUOR DO., (P. L.) AQUA DO., (P. E. & D.) *Prep.* Lime lb. ss; *cold* water added gradually so as to slake the lime 6 quarts; agitate well together in a covered vessel; after repose decant the clear, and keep it in stoppered bottles from the air. (See LIME.) *Dose.* ½ to 3 oz. or more, 2 or 3 times a day in milk or broth. It is antacid and astringent, and is taken in dyspepsia, diarrhœa, calculous affections, &c.

SOLUTION OF MAGNESIA. *Syn.* FLUID MAGNESIA. CARBONATED MAGNESIA-WATER. ÆRATED DO. AQUA vel LIQUOR MAGNESIÆ BICARBONATIS. CONDENSED SOLUTION OF MAGNESIA. *Prep.* (Dinneford's.) Water and Howard's heavy carbonate of magnesia, in the proportion of 17½ grs. of the latter to every fluid oz. of the former, are introduced into a cylindrical tinned copper vessel, and

carbonic acid, generated by the action of sulphuric acid on whiting, is forced into it by steam power, for 5½ hours, during the whole of which time the cylinder is kept moving. Antacid and laxative. *** The Paris Codex orders recently precipitated carbonate of magnesia to be used while still moist.

SOLUTION OF ACETATE OF MORPHIA. *Syn.* SOLUTIO MORPHIÆ ACETATIS. *Prep.* (Majendie.) Acetate of morphia 16 grs.; acetic acid 4 drops; rectified spirit f ʒj; water f ℥j; dissolve. *** Each f ʒss contains nearly 1 gr. of acetate of morphia. *Dose.* 5 to 10 drops.

SOLUTION OF CITRATE OF MORPHIA. *Syn.* LIQUOR MORPHIÆ CITRATIS. *Prep.* (Majendie.) Pure morphia 16 grs.; citric acid 8 grs.; water f ℥j; tincture of cochineal f ʒij; dissolve. *Dose.* 3 to 10 drops.

SOLUTION OF MURIATE OF MORPHIA. *Syn.* SOLUTIO MORPHIÆ MURIATIS. *Prep.* —1. (P. E.) Muriate of morphia ʒiss; rectified spirit f ℥v; water f ℥xv; dissolve. Contains 1 gr. in 106 minims. *Dose.* 10 to 30 drops.—2. (*Apothecaries' Hall.*) Muriate of morphia 16 grs.; rectified spirit f ʒj; water f ℥j; dissolve. *Dose.* 3 to 10 drops.

SOLUTION OF SULPHATE OF MORPHIA. *Syn.* LIQUOR MORPHIÆ SULPHATIS. *Prep.* (Majendie.) Sulphate of morphia 16 grs.; water f ℥j; rectified spirit f ʒj; dilute sulphuric acid 4 drops; dissolve. *Dose.* 5 to 10 drops.

SOLUTION OF NITRATE OF BARYTA. *Syn.* SOLUTIO BARYTÆ NITRATIS. *Prep.* (P. E.) Nitrate of baryta 40 grains; water 800 grs.; dissolve. *Used* as a test for sulphuric acid.

SOLUTION OF NITRATE OF SILVER. *Syn.* LIQUOR ARGENTI NITRATIS, (P. L.) SOLUTIO DO. DO., (P. E.) *Prep.* Nitrate of silver (pure) ʒj, (40 grs. P. E.;) distilled water f ℥j, (1600 grs. P. E.;) dissolve. *Used* as a test for chlorine, chlorides, and muriatic acid. It should be kept from the light.

SOLUTION OF OPIUM. (SEDATIVE.) *Syn.* LIQUOR OPII SEDATIVUS. *Prep.* (*Battley's.*)—1. Hard extract of opium 3 oz.; water 1½ pints; boil till dissolved, cool, filter, and add rectified spirit of wine 6 oz.; water q. s. to make the whole exactly measure 1 quart.—2. Extract of opium (P. L.) 4½ oz; water 1 quart, boil till reduced to 34 oz.; cool, filter, and add rectified spirit 6 oz., and water q. s. to make exactly 1 quart.—3. Hard extract of opium 22 oz.; boiling water 13 pints; dissolve, cool, add rectified spirit 3 pints, and filter. Less exciting than opium. *Dose.* 10 to 25 drops. (Cooley, Chem., v. 170.)

SOLUTION OF PHOSPHATE OF SODA. *Syn.* SOLUTIO SODÆ PHOSPHATIS. *Prep.* (P. E.) Crystallized phosphate of soda 175 grs.; water f ℥viij; dissolve, and keep it in a corked bottle. *Used* as a test.

SOLUTION OF POTASSA. *Syn.* CAUSTIC POTASH WATER. LIQUOR POTASSÆ, (P. L.) AQUA POTASSÆ, (P. E.) DO. DO. CAUSTICÆ, (P. D.) *Prep.* (P. L.) Lime (recently burnt) ℥viij; boiling distilled water 1 gallon; sprinkle a little of the water on the lime in an earthen vessel, and when it is slaked and fallen to powder, add carbonate of potash ℥xv, dissolved in the remainder of the water · bung down, and shake frequently, until cold, then allow the whole to settle, and decant the clear supernatant portion into perfectly clean and stoppered green glass bottles. If well managed, it need not be filtered; but if it is, clean calico should be employed, and the operation conducted out of contact with the air. (See FILTRATION.)—2. (*Wholesale.*) Carbonate of potash (Kali) 1 lb., and quicklime ½ lb., to each gallon of water; as last. The formulæ of the E. and D. colleges vary only as regards the strength. Sp. gr. of the Liq. Potassæ, P. L., 1·063; of the P. E. 1·072; P. D. 1·080. *** It should emit few or no bubbles of carbonic acid gas, on the addition of dilute nitric acid. Scarcely any thing is precipitated by carbonate of soda, chloride of barium, or nitrate of silver. It turns turmeric brown, and is precipitated by chloride of platina. (P. L.) *Dose.* 10 to 30 drops, in any bland diluent, as an antacid, diuretic, or lithontriptic. (See BRANDISH'S SOLUTION.) —3. (*Henry's pure potash water.*) Made up to the sp. gr. 1·1. Two measures possess the same saturating power as one of his carbonate of potash water. *Used* in testing.

SOLUTION OF POTASSA, (EFFERVESCING.) *Syn.* LIQUOR POTASSÆ BICARBONATIS. LIQ. POTASSÆ EFFERVESCENS, (P. L.) AQUA DO. DO. (P. E.) *Prep.* (P. L.) Bicarbonate of potash ʒj; distilled water 1 pint; dissolve and force in carbonic acid gas in excess; keep it in a well-stoppered vessel. Resembles soda water. An excellent substitute for this preparation is to pour a bottle of soda-water into a tumbler containing 20 grs. of powdered bicarbonate of potash, and to drink it immediately.

SOLUTION OF SODA. *Syn.* HENRY'S PURE SODA WATER. A solution of caustic soda made up to the sp. gr. 1·07; has the same saturating power as his carbonate of soda water.

SOLUTION OF CARBONATE OF SODA. *Syn.* SUBCARBONATE OF SODA WATER. LIQ. SODÆ CARBONATIS. AQUA DO. DO., (P. D.) *Prep.* Crystallized carbonate of soda ℥j; water 1 pint; dissolve. Sp. gr. 1·024. *Dose.* ¼ oz. to 2 oz., as an antacid; in heartburn, dyspepsia, &c.

SOLUTION OF SODA, (EFFERVESCING.) *Syn.* SODA WATER. LIQUOR SODÆ EFFERVESCENS, (P. L.) AQUA DO. DO., (P. E.) LIQ. SODÆ BICARBONATIS. AQUA SODÆ CARBONATIS ACIDULA, (P. D.) *Prep.* Sesquicarbonate of soda ʒj; distilled water 1 pint; dissolve and force carbonic acid gas into the solution. *Used* as an antacid and grateful stimulant, often proving gently laxative. The soda water of the shops cannot be substituted for this preparation, as, in opposition to its name, it is usually made without soda.

SOLUTION OF SULPHURET OF POTASSIUM. *Syn.* SOLUTION OF SULPHURET OF POTASH. SOLUTIO POTASSII SULPHURETI. AQUA POTASSÆ SULPHURETI, (P. D.) *Prep.* Washed sulphur 1 part; water of caustic potassa 11 parts; boil 10 minutes, filter, and keep the solution in well-closed bottles. *Dose.* 10 to 60 drops, diluted with water, and externally made into a lotion, in itch, and several other eruptive diseases.

SORBIC ACID. Malic acid obtained from the berries of the mountain ash. (See MALIC ACID.)

SOUP. In COOKERY; a strong decoction of flesh, properly seasoned with salt, spices, &c., for

he table. The different tastes of people require nore or less of the flavor of spices, salt, garlic, utter, &c., which can never be ordered by general ules; and if the cook has not a good taste, and ttention to that of her employers, not all the in- redients which nature and art can furnish will ive exquisite flavor to her dishes. The proper rticles should be at hand, and she must propor- ion them until the true zest be obtained, and a ariety of flavor be given to the different dishes erved at the same time.

SOUP, PORTABLE. *Syn.* Glaze. *Prep.* . Break the bones of a leg or shin of beef, put it nto a digester that will fairly hold it, cover with old water, boil it gently for 8 or 10 hours, strain, t it cool, take off the fat, pour into a shallow tewpan, add whole black pepper ¼ oz., boil away about a quart, pour it into a smaller stewpan, nd simmer gently till it is reduced to the thick- ess of a sirup; then either pour it into small up- ight jelly-pots, with covers, and when cold, paste he joints over with paper; or pour it out upon flat ishes, to lie about ¼ inch deep; when set, di- ide it into pieces and dry them. A shin of eef of 9 lbs. produced 9 oz. of portable soup, nd 2¼ lbs. of meat fit for potting.—2. From gela- n melted with a little water, and flavored.— *Ised* on voyages, dissolved in boiling water, to nake soup.

SOY. Genuine soy is a species of thick black auce, imported from China, prepared with white aricots, wheat flour, salt, and water; but a spu- ious kind is made in England as follows:—Seeds f dolichos soja (peas or kidney beans may be used or them) 1 gall., boil till soft, add bruised wheat gall., keep in a warm place for 24 hours, then dd common salt 1 gall.; water 2 gall.; put the whole into a stone jar, bung it up for two or hree months, shaking it very frequently, then ress out the liquor; the residuum may be treat- d afresh with water and salt, for soy of an infe- ior quality.

SPECIES. Mixtures of dried plants, or parts f plants, in a divided state; which, for conveni- nce, are kept mixed for use. The dry ingredients f pills, conserves, electuaries, mixtures, &c., that o not keep well when made up, or which are in ttle demand, may be economically and conve- iently preserved in this state.

SPECIFIC FOR WORMS. (*Herren- chwand's.*) *Prep.* Gamboge 10 grs.; salt of artar 20 grs.; mix.

SPECIFIC GRAVITY is the density of the natter of which any body is composed, compared the density of another body, assumed as the tandard, or 1·000. This standard is pure distilled water for liquids and solids, and atmospheric air or gaseous bodies and vapors. In England the p. gr. is usually taken at 62° F.; but in France t 32°, or the temperature of melting ice. In most ases, however, it is sufficient merely to note the emperature, and to apply a correction, depending n the known density of water or air, at the dif- erent degrees of the thermometric scale To de- ermine the specific gravity of a solid, we weigh , first in the air, and then in water. In the lat- er case it loses, of its weight, a quantity precisely qual to the weight of its own bulk of water; and ence, by comparing this weight with its total weight, we find its specific gravity. The rule therefore is,—Divide the total weight by the *loss* of weight in water; the quotient is the specific gravity. If it be a liquid or a gas, we weigh it in a sp. gr. bottle, glass flask, or other vessel of known capacity; and dividing that weight by the weight of the same bulk of water, the quotient is, as before, the specific gravity. (See Hydrometer.)

SPECULUM, METAL. *Prep.* 1. Copper 64 parts; pure tin 29 do.—2. Copper 2 parts; pure tin 1 do. Melt the metals separately under a little black flux; incorporate thoroughly by stirring with a wooden spatula, then run the metal into the moulds, so that the face of the in- tended mirror may be downwards; cool slowly. *Used* to make the mirrors of reflecting telescopes. The addition of a little metallic arsenic renders it whiter.

SPICE, COW. *Syn.* Horsespice. Species Equinus. *Prep.*—1. Turmeric, aniseed, liquorice, and diapente, equal parts.—2. Turmeric and cumin seed, of each 5 lbs.; ginger 2½ lbs.—3. Cayenne 2 oz.; bean flour and mustard hulls, of each 45 lbs.; cumin and caraway, of each 15 lbs.; . urmeric 12 lbs.; charcoal 2 lbs. Mix. *Used* by farriers.

SPICE, RAGOUT. *Prep.* Flour of mustard, black pepper, and grated lemon peel, of each ½ lb.; allspice, ginger, and nutmegs, of each ¼ oz.; cayenne pepper 2 oz.; dry salt 1 lb.; all in powder. Mix.

SPICE, SAUSAGE. (*French.*) *Syn.* Epices Fines. *Prep.* Black pepper 5 lbs.; cloves and nutmegs, of each 1½ lbs.; ginger 2½ lbs.; aniseed and coriander seeds, of each ¾ lb.; powder, and mix.

SPICE, SAVORY. (Kidder's.) *Prep.* Cloves, mace, nutmegs, pepper, and salt, equal parts. *Used* by cooks.

SPICE, SWEET. (Kidder's.) *Prep.* Cloves, mace, nutmegs, cinnamon, and sugar, equal parts; mix. *Used* in pastry.

SPIELMAN'S CAMPHORATED VINE- GAR. *Prep.* Camphor ʒj; alcohol 20 drops; powder; add sugar ℥ij; triturate, and further add distilled vinegar ℥x. *Dose.* 2 to 4 drs.

SPIRIT. Under this term are included all the inflammable and intoxicating liquors obtained by distillation, and used as beverages; as brandy, gin, rum, &c., each of which has been noticed in its alphabetical order. Spirit may also be obtain- ed by fermentation and distillation from all vege- table juices or solutions that contain sugar.—Alcohol P. L. has the sp. gr. 0·815—P. E. 0·796—P. D. 0·810—P. Cod. (*Alcohol absolue*) 0·797.—Rectified Spirit of Wine (*Spiritus rectificatus*) P. L. & E. has the sp. gr. 0·838—P. D. 0·840—P. U. S. 0·835.—Proof Spirit (*Spiritus tenuior*) P. L. & E. has the sp. gr. 0·920, and is made by mixing 5 pints of rectified spirit with 3 pints of water,—P. Cod. (*Alcohol faible*) 0·923.—The *Alcohol du Commerce* P. Cod. has the sp. gr. 0·863. Rectified spirit is obtained by the rectifica- tion of raw corn spirit at a gentle heat, by which the stronger and purer portion alone passes over Pearlash or quicklime is commonly added to retain the oil and water.

Spirits (*in Pharmacy*) are prepared by ma-

serating the bruised seeds, flowers, herbs, &c. in the spirit for 2 or 3 days before distillation, and then drawing off the spirit by a gentle heat. If a naked fire be employed, a little water should be put into the still along with the spirit, to prevent empyreuma. They are also very frequently prepared extemporaneously, by adding a proper proportion of essential oil to pure spirit of the prescribed strength. These spirits are mostly employed as aromatics and stimulants, in doses of ½ oz. to 1 oz.

SPIRITS (*in Perfumery*) are prepared from aromatic and odorous substances, by a similar process to that just described; but in this case a very pure and scentless spirit must be employed, and the distillation should be preferably conducted by steam heat or a water bath, and the distilled spirit should be kept for some time in a cellar or other cold situation previously to being used. When simple solution of an essential oil in the spirit is adopted, care should be taken that the oil is pale and new; or, at least, has not been much exposed to the air; as in that case it would contain resin, which would make the perfumed spirit, or essence, liable to stain delicate articles of clothing to which it may be applied. The perfumed spirits of some flowers cannot be well obtained in either of the above ways, or, at least, are not usually so prepared by the foreign perfumers. The spirits of orange flowers, jasmin, tuberose, jonquille, roses, and some other flowers, and of cassia, vanilla, &c., are commonly prepared by digesting pure rectified spirit of wine for 3 or 4 days on half its weight of the respective pommades or oils, obtained by infusion or contact. The operation is performed in a close vessel placed in a water bath, and frequent agitation is employed for 3 or 4 days, when the perfumed spirit is decanted into a second digester, containing a like quantity of oil to the first; and the whole process is repeated a *second* and a *third* time, after which the spirit is allowed to settle and is then decanted, when it forms the most fragrant and perfect essence or spirit of the perfumer. This is called spirit of the first infusion. The three portions of oil are then treated again with fresh spirit in the same manner, and thus spirits or essences of inferior quality are obtained, which are distinguished by the perfumers as No. 2, 3, 4, &c.; or spirits of the *first*, *second*, *third*, &c., operation or infusion. In some, though very few cases, the spirits are afterwards distilled. These spirits are also frequently obtained by other processes, which have been already noticed.

*** For further information on spirits and their preparation, see ALCOHOL, ALCOHOLOMETRY, DISTILLATION, BRANDY, RUM, GIN, EAUX, ESPRITS, ESSENCES, WATERS.

SPIRIT OF AMMONIA. *Syn.* ALCOHOL AMMONIATUM. SPIRITUS AMMONIÆ, (P. L. E. & D.) *Prep.*—1. (P. L.) Muriate of ammonia ℥x; carbonate of potash ℥xvj; rectified spirit and water, of each 3 pints; mix, and let 3 pints distil.—2. (P. D.) Dissolve ℥iiiss of carbonate of ammonia in rectified spirit, 3 wine pints.—3. (P. E.) Quicklime ℥xij; slake with water f℥viss; add finely-powdered muriate of ammonia ℥viij, and distil in a glass retort, furnished with a tube reaching nearly to the bottom of a bottle containing 2 pints and f℥ij of rectified spirit, and kept well cooled. A sand heat is to be employed, and the distillation continued as long as any thing passes over. *Dose.* ½ to 1 dr.; in hysteria, flatulent colic, nervous debility, &c.

SPIRIT OF AMMONIA, (AROMATIC.) *Syn.* ALCOHOL AMMONIATUM AROMATICUM. SPIRIT OF SAL VOLATILE. SPIRITUS AMMONIÆ AROMATICUS, (P. L. E. & D.) *Prep.*—1. (P. L.) Muriate of ammonia ℥v; carbonate of potash ℥viij; bruised cinnamon and cloves, of each ʒij; fresh lemon peel ℥iv; rectified spirit and water, of each ½ gallon; mix and distil 6 pints.—2. (P. D.) Spirit of ammonia 2 pints, (wine measure;) oil of lemon ʒij; bruised nutmegs ℥ss; do. cinnamon ʒiij; digest for three days, then distil 1½ pints.—3 (P. E.) Spirit of ammonia f℥viij; oil of lemon fʒj; oil of rosemary fʒiss; dissolve. *Dose.* ½ to 2 drs., diluted with water, in lowness of spirits, debility, hysteria, dyspepsia, &c.

SPIRIT OF AMMONIA, (FETID.) *Syn.* ALCOHOL AMMONIATUM FŒTIDUM. SPIRITUS AMMONIÆ FŒTIDUS, (P. L. E. & D.)—1. (P. L.) As spirit of ammonia, but adding asafœtida ℥v, before distillation.—2. Spirit of ammonia 1 lb.; tincture of asafœtida ℥ss; mix. *Dose.* A teaspoonful in hysteria, &c.

SPIRIT OF ANISEED. *Syn.* SPIRITUS ANISI. *Prep.*—1. (P. L.) Bruised aniseed ℥x; proof spirit 1 gallon; water 1 quart, (or q. s.;) distil 1 gallon.—2. (*Sp. Anisi Compositus*, P. D.) Anise and angelica seeds, of each lb. ss; proof spirit 1 gallon; water q. s.; distil 1 gallon. When colored with saffron, or sap green, the last resembles the Irish *Usquebaugh*. (Montgomery.) *Dose.* 1 to 4 drs.

SPIRIT OF CARAWAY. *Syn.* SPIRITUS CARUI, (P. L. E. & D.) *Prep.* (P. L.) Bruised caraway seeds ℥xxij; proof spirit 1 gallon; water 1 quart, or q. s.; distil 1 gallon. Aromatic and carminative. *Dose.* 1 to 4 drs. "Sweetened with sugar, this spirit is drunk in Germany as a dram, (*Kümelliqueur; Kümelbrandtwein.*") (Pereira.)

SPIRIT OF CASSIA. *Syn.* SPIRITUS CASSIÆ. *Prep.* (P. E.) Coarsely-powdered cassia lb. j; proof spirit 7 pints; water 1½ pints, or q. s.; draw off 7 pints. *Dose.* 1 to 4 drs. *** Almost universally substituted for spirit of cinnamon.

SPIRIT OF CINNAMON. *Syn.* SPIRITUS CINNAMOMI, (P. L. E. & D.) *Prep.*—1. (P. L.) Oil of cinnamon ʒij; proof spirit 1 gallon; water 1 pint, or q. s.; distil 1 gallon.—2. (P. E.) As spirit of cassia, P. E., using cinnamon bark. Aromatic and stimulant. *Dose.* 1 to 4 drs.

SPIRIT OF CYTHEREA. *Prep.* Spirits of violets, tuberose, clove-gillyflower, jasmin, (No. 2,) roses, (No. 2,) and portugal, of each 1 quart; orange-flower water 2 quarts; mix. A delightful perfume.

SPIRIT, DYER'S. *Prep.* Dyer's aquafortis 7 lbs.; grain tin 1 lb.; dissolve, with agitation. *Used* in dyeing with lac dye; for cochineal use less tin.—2. Nitric acid 3 lbs.; sal ammoniac 1 lb.; tin q. s. to dissolve without effervescence. *Used* with cochineal. (See TIN MORDANTS.)

SPIRIT OF THE FLOWERS OF ITALY. *Syn.* ESPRIT DE FLEURS. *Prep.* Spirits of

roses, (No. 1,) jasmin, (No. 2,) oranges, (No. 3,) and cassia, (No. 2,) of each 4 pints; orange-flower water 3 pints; mix. Very fragrant.

SPIRIT OF HARTSHORN. *Syn.* Liquor Volatilis Cornu Cervi. Originally distilled from hartshorn, but is now universally made by dissolving sesquicarbonate of ammonia in water, so as to form a solution of the sp. gr. 1·060. The pungency is commonly increased by passing a little ammoniacal gas into it, or by adding a small quantity of liquor of ammonia. Dilute liquor of ammonia is also frequently sold for spirit of hartshorn.

SPIRIT OF HORSERADISH, (COMPOUND.) *Syn.* Spiritus Armoraciæ compositus, (P. L. & D.) *Prep.* (P. L.) Sliced horseradish and dried orange-peel, of each ℥xx; bruised nutmegs ʒv; proof spirit 1 gallon; water 1 quart, or q. s.; distil 1 gallon. Stimulant and diuretic. *Dose.* 1 to 4 drs.

SPIRIT OF JUNIPER, (COMPOUND.) *Syn.* Spiritus Juniperi compositus, (P. L. E. & D.) *Prep.* 1. (P. L.) Bruised juniper berries ℥xv; do. caraway and fennel, of each ℥ij; proof spirit 1 gallon; water 1 quart, or q. s.; distil 1 gallon. 2. (*Wholesale.*) Oil of juniper ʒij; oils of caraway and sweet fennel, of each ʒss; proof spirit 5 quarts; if foul, filter through magnesia. Stimulant and diuretic. *Dose.* 2 to 4 drs. *** This spirit, when mixed with twice or thrice its weight of proof spirit, and sweetened with a little sugar, makes no bad imitation of Holland gin.

SPIRIT OF LAVENDER. *Syn.* Spiritus Lavandulæ. *Prep.* (P. L.) Fresh lavender lb. iiss; rectified spirit of wine 1 gallon; water 1 quart, or q. s.; distil 1 gallon. 2. (*Wholesale.*) English oil of lavender 3 oz.; rectified spirit 1 gallon; dissolve. Cordial and fragrant.

SPIRIT OF MURIATIC ETHER. *Syn.* Dulcified Marine Acid. Clutton's Febrifuge Spirit. Spiritus Salis Dulcis. Sp. Muriatico-æthereus. Æther Muriaticus Alcoholicus. *Prep.* 1. (P. E. 1735.) Muriatic acid 1 part; rectified spirit 3 parts; digest some days, and distil in a sand-bath. 2. Hydrochloric ether and spirits of wine, equal parts; mix. *Dose.* fʒj to fʒiij, in dyspepsia, liver complaints, hectic fever, &c.

SPIRIT OF NITRIC ETHER. *Syn.* Sweet Spirits of Nitre. Nitre Drops. Nitre Dulcis. Spiritus Nitri Dulcis, (P. L. 1745.) Sp. Ætheris Nitrosi, (P. L. 1788.) Sp. Ætheris Nitrici, (P. L. 1809, and since, & P. E.) Sp. Æthereus Nitrosus, (P. D.) *Prep.* 1. (P. L.) Rectified spirit lb. iij; nitric acid ℥iv; mix gradually, and distil f℥xxxij. *** An earthenware still and condensing worm should be employed. 2. (P. E.) Pure hyponitrous ether (P. E.) 1 part; rectified spirit 4 parts; mix. 3. (Dr. Geisler.) 24 oz. of alcohol of 0·840 are mixed with 4 oz. sulphuric acid, left to stand for 8 days, then poured into a retort containing 4½ oz. of dried nitre; 20 oz. of the liquid are distilled over at a gentle heat, which is then rectified over magnesia. Copper retorts and tinned cooling apparatus may be employed in this process without any disadvantage. The preparation is pretty constant in its amount of ether. Mixing of nitric ether with alcohol cannot afford an officinal *Spir. æther. nitr.*, as it always contains aldehyd.* Preservation over magnesia is not practicable, as it constantly gives rise to decomposition and formation of nitrite of magnesia. (Arch. der Pharm., xxviii. p. 60.)

Remarks. Pure sweet spirits of nitre scarcely reddens litmus paper, and gives off no bubbles of carbonic acid gas, on the addition of carbonate of soda. Sp. gr. 0·834. (P. L.) "When agitated with twice its volume of concentrated solution o. muriate of lime, 12§ of ether slowly separates. Density 0·847." (P. E.) *Dose.* ½ to 3 drs. as a febrifuge and diaphoretic. *** The mass of the sweet spirits of nitre of the shops is of very inferior quality, and is scarcely, if ever, made directly from spirit that has paid the duty. One and a very large portion is obtained from Scotland, another from the manufacturers of fulminating mercury, and a third, and in fact, the principal part, from certain persons in the neighborhood of the metropolis, who employ contraband spirit for its preparation, as this article is not under the excise. The truth of the above is well known, as the price at which this spirit is sold is alone sufficient testimony. The price of rectified spirit, purchased in quantity at the distillery, is from 16*s.* 4*d.* to 16*s.* 8*d.* per gallon, or about 2*s.* 0*d.* per lb., (av.,) whereas the sweet spirits of nitre, sp. gr. ·850, is commonly and publicly sold, in quantity, at 1*s.* 7*d.* to 1*s.* 9*d.* per lb., (av.,) and I have seen it purchased so low as 1*s.* 6*d.* This calls for the interference of the excise. The spirit obtained from the manufacturers of fulminating mercury frequently contains prussic acid, which may be discovered by testing. (See Prussic Acid.)

SPIRIT OF NUTMEG. *Syn.* Spiritus Nucis Moschatæ. Sp. Myristicæ, (P. L. E. & D.) *Prep.* (P. L.) Bruised nutmegs ℥iiss; proof spirit 1 gallon; water 1 pint, or q. s.; distil a gallon. Cordial and carminative. *Dose.* 1 to 4 drs.; mostly used to flavor mixtures and draughts.

SPIRIT OF PENNYROYAL. *Syn.* Spiritus Pulegii. Sp. Menthæ Pulegii, (P. L.) Prepared like spirit of peppermint, P. L. Stimulant; antispasmodic; carminative. *Dose.* ½ to 2 drs.

SPIRIT OF PEPPERMINT. *Syn.* Spiritus Menthæ Piperitæ, (P. L. & D.) Sp. Menthæ, (P. E.) *Prep.* 1. (P. L.) Oil of peppermint ʒiij; rectified spirit 1 gallon; water 1 pint, or q. s.; dissolve, and distil 1 gallon. 2. Omit the water and distillation. 3. (P. E.) Green peppermint lb. iss; proof spirit 7 pints; macerate 2 days; add water q. s., and distil 7 pints. *Dose.* ½ to 2 drs. (See Essence of Peppermint.)

SPIRIT OF PIMENTO. *Syn.* Spirit of Allspice. Spiritus Pimentæ, (P. L. E. & D.) Bruised allspice ℥iiss; proof spirit 1 gallon; water 1 pint, or q. s.; distil a gallon. Carminative and stomachic. *Dose.* 1 to 4 drs., in mixtures, &c.

SPIRIT, PYROACETIC. *Syn.* Pyroacetic Ether. Acétone. Esprit Pyroacetique, (*Fr.*) Brennzlicher Essiggeist; Mesit, (*Ger.*) Spiritus Pyroaceticus, (*Lat.*) An ethereal liquid, obtained by passing the vapor of hydrated acetic acid through a porcelain tube heated to dull redness; or by the dry distillation of the acetates, the bases of which retain carbonic acid at a red heat

* According to Prof. Liebig, this aldehyd is an essent constituent of the officinal nitric ether.

The acetates of lime, manganese, zinc, lead, iron, and copper, thus yield it in quantities decreasing in the order in which they stand. It is chiefly formed during the second half of the process; the liquor which comes over then should be set apart, and decanted from empyreumatic oil, &c. Pyroacetic spirit is also obtained in considerable quantity by distilling the tarry deposite of crude pyroligneous acid. The product of either process is purified by rectification, first from quicklime, and next from bone-black. *** Pure acetone is a clear colorless liquid; miscible with water, alcohol, and ether, in all proportions; has a pungent taste, resembling that of peppermint, and a penetrating and slightly empyreumatic smell; sp. gr. 0·7922; boils at 132°; very inflammable, giving a brilliant flame without smoke; and dissolves resins and essential oils. Strong sulphuric acid converts it into a species of ether. It is used in lamps, and to dissolve gums by the hatters.

SPIRIT, PYROXILIC. *Syn.* PYROLIGNEOUS SPIRIT. WOOD NAPHTHA. HYDRATE OF OXIDE OF METHULE. BIHYDRATE OF METHYLENE. Commercial pyroxilic spirit is obtained by saturating crude pyroligneous acid after it is separated from the tar, with quicklime and distilling, when about 1% of spirit is obtained, which is purified by 2 or 3 rectifications. In this state it contains acetone and other inflammable fluids, from which it may be separated by distilling it along with an excess of muriate of lime, in a water-bath, as long as any volatile matter passes over, which are the impurities. A quantity of water equal to the spirit employed is then added, and the distillation continued. The product is now pyroxilic spirit combined with a little water, from which it may be freed by distillation along with quicklime. *** Pure pyroxilic spirit is a transparent, colorless liquid, having a penetrating ethereal smell; it is very inflammable, yielding a pale blue flame, by which it may be readily distinguished from pyroacetic spirit. It is neutral to test-paper, mixes with water, alcohol, and ether; boils at 150°; sp. gr. 0·798 at 68° F. (Liebig.—0·824, Ure.) It is used to dissolve resins and oils.

SPIRIT, RAISIN. From raisins fermented along with water, and the wash distilled by a quick fire. *Used* to give a brandy flavor to malt spirit. 1 gallon added to 150 gallons of plain spirit, along with some coloring, and a little catechu, makes a very decent "British brandy."

SPIRIT OF ROSEMARY. *Syn.* SPIRITUS ROSEMARINI. (P. L. E. & D.) *Prep.* 1. (P. L.) Oil of rosemary ℨij; rectified spirit 1 gall.; water 1 pint, or q. s.; distil a gallon. 2. As last; but omit the water and distillation. 3. Rosemary tops lb. iiss; proof spirit 1 gallon; water q. s.; distil a gallon. Fragrant.

SPIRIT OF SPEARMINT. *Syn.* SPIRITUS MENTHÆ VIRIDIS, (P. L. & D.) *Prep.* (P. L.) As spirit of peppermint, P. L. *Dose* and *use* the same.

SPIRIT OF SOUP HERBS. (KITCHINER'S.) *Prep.* Lemon thyme, winter savory, sweet marjoram, and sweet basil, of each, 1 oz.; grated lemon-peel and shalotes, of each, ½ oz.; bruised celery seed 1 dr.; proof spirit 1 quart; macerate 10 days and strain. *Used* as a flavoring by cooks.

SPIRIT OF SULPHURIC ETHER. *Syn.* SWEET SPIRIT OF VITRIOL. ÆTHER SULPHURICUS CUM ALCOHOLE. SPIRITUS VITRIOLI DULCIS. SP. ÆTHERIS SULPHURICI, (P. E.) Do. DO. VITRIOLICI. *Prep.* (P. E.) Sulphuric ether 1 pint; rectified spirit 1 quart; mix. Sp. gr. 0·809. It should be neutral to test paper, mix (clear) with water, and when shaken with twice its volume of concentrated solution of muriate of lime, 28% of ether should separate. *Dose.* f℥j to f℥iij; as a stimulant and anodyne.

SPIRIT OF SULPHURIC ETHER, (COMPOUND.) *Syn.* HOFFMAN'S ANODYNE LIQUOR. MINERAL DO. DO. SPIRITUS ÆTHERIS SULPHURICI COMPOSITUS, (P. L.) Do. DO. VITRIOLICI COMP. *Prep.* (P. L.) Sulphuric ether f℥viij; rectified spirit f℥xvj; ethereal oil f℥iij; mix. *Dose.* f℥ss to f℥ij; as an anodyne.

SPIRIT OF SULPHURIC ETHER, (AROMATIC.) *Syn.* AROMATIC SPIRIT OF ETHER. SWEET ELIXIR OF VITRIOL. SPIRITUS ÆTHERIS AROMATICUS. ELIXIR VITRIOLI DULCE. *Prep.* (P. L. 1824.) Bruised cinnamon ℨiij; cardamoms ℨiss; long pepper and ginger, of each, ℨj; rectified spirit 10 oz.; sulphuric ether 5 oz.; mix, and digest 14 days. The last two preparations are also frequently called "*Sweet Elixir of Vitriol.*"

SPONGE, BURNT. *Syn.* SPONGIA USTA. PULVIS SPONGIÆ USTÆ. *Prep.* (P. D.) Beat pieces of sponge to remove the sand and stones, then burn it in a closed iron vessel till it becomes black and friable; allow it to cool, excluded from the air, and reduce it to powder. *Used* in bronchocele and scrofulous complaints. *Dose.* 1 to 3 drs. made into an electuary or lozenges. *** If good it evolves violet fumes of iodine when heated in a flask along with sulphuric acid. The burnt sponge of the shops is made from the cuttings and unsaleable pieces.

SPONGE, PREPARED. *Syn.* SPONGIA CERATA. Sponge dipped into melted wax and compressed between 2 iron plates till cold. *Used* by surgeons to make *sponge tents.*

SPONGE, WHITE. *Syn.* BLEACHED SPONGE. SPONGIA DEALBATA. *Prep.* Soak the sponge in *very dilute* muriatic acid to remove calcareous matter, then in cold water, changing it frequently, and squeezing the sponge out each time; next soak it in water, holding a little sulphuric or sulphurous acid, or chlorine in solution, changing the acid frequently till the sponge is sufficiently bleached; last, repeatedly wash and soak in clean water, and scent with rose or orange-flower water.

STARCH. *Syn.* AMIDON; FECULE, (*Fr.*) STAERKE, (*Ger.*) AMYLUM, (*Lat.*) Αμυλον, (*Gr.* from α, *privative*, and μυλη, *a mill.*) One of the commonest frauds practised upon the profession and the public is the mixing cheap kinds of starch with arrow-root, and vending manufactured for genuine tapioca, sago, and other articles of diet, used for invalids and children. M. Gobley has proposed a method for the ready detection of these frauds, which is very simple, consisting merely in placing various kinds of starch, in a moist state, in watch-glasses, and covering them over with a bell-glass, under which there is also placed *iodine*, and leaving them for 24 hours. The vapor of the

iodine acts upon, and colors all kinds of starch, but the color it imparts varies with the different kinds. Thus the vapor of iodine colors—

Wheat-starch, violet.

Potato-starch, dove gray.

Genuine arrow-root, bright chocolate color.

Genuine tapioca, unbroken, uniformly yellowish.

Ditto, powdered, chamois color.

White sago, entire, some granules violet gray, others yellowish.

Ditto, powdered, chamois color.

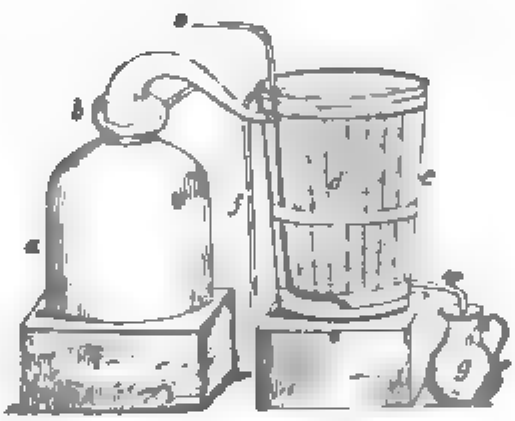
Dextrine, no coloring.

This method, at all events, renders the detection of potato-starch very easy, and also whether common or potato starch is substituted for tapioca powder, and probably some modification of it will render it still further applicable. (Jour. de Pharm., April, 1844.)

STEARIC ACID. *Syn.* STEARINE. HYDROMARGARULIC ACID. *Prep.* I. (*Commercial.*) Tallow is boiled in large wooden vessels, by means of high-pressure steam, with about 16% of hydrate of lime (eq. to 11% of pure lime) for 3 or 4 hours till the combination is complete, when the whole is allowed to cool. The stearate of lime is then transferred to another wooden vessel, and decomposed, by 4 parts of oil of vitriol diluted with water, for every 3 parts of slaked lime employed, the action being promoted by steam heat. After repose the liberated fat is decanted from the sediment of sulphate of lime and water, and is well washed with water, and by blowing steam into it; it is next reduced to shavings by means of a number of knives worked by machinery, and in this divided state is placed in canvass bags and submitted to the action of a powerful hydraulic press, which expels a large portion of the oleine; the pressed cakes are then a second time exposed to the action of steam and water, again cooled and coarsely powdered, and again submitted to the joint action of steam and pressure; they are lastly melted and cast into blocks for sale.—2. (*Pure.*) Repeatedly crystallize commercial stearic acid from hot alcohol, till its melting point becomes constant at 167°. Brilliant pearly scales, soluble in ether and hot alcohol, and forming salts called *stearates* with the bases. The commercial acid is used to make candles.

STEAROPTENE. The name given by Herberger to the concrete portion or camphor of volatile oils. Bizio calls it *stereusin*.

STILL. (From *stillare*, to drop.) A vessel or apparatus employed for the distillation of liquids on the large scale. The forms of stills, and the materials of which they are made, vary according to the purposes for which they are intended. The following figure represents the most common and useful apparatus of this kind. After the fluid is put into the still, the head must be placed on and connected with the refrigerator, and the joints must be all securely luted. For ordinary liquids, a stiff paste made with linseed meal and water, to which a little chalk may be added, will answer well for this purpose. The worm tub should be supplied with cold water in sufficient quantity to preserve its contents at a proper temperature; and the application of heat should be so regulated that the liquid may drop from the end of the refrigerator quite cold and unaccompanied with vapor.



a, Body of still, which may be either placed in a steam jacket, or in a brick furnace.
b, Still head or capital.
c, Worm tub.
d, Pewter worm, or refrigerator.
e, Cold water pipe.
f, Waste pipe.
g, Receiver.

STRAINED GALBANUM. This is either prepared by boiling the gum resin in water until dissolved, then straining it through a canvass or hair sieve and evaporating; or by melting it in the dry state by heat cautiously and quickly applied, and straining it through a piece of coarse canvass stretched across a frame. (See FILTRATION.) The STRAINED GALBANUM of the shops is mostly *reduced* with inferior drugs, and very frequently a *factitious article* is substituted. The following forms are those which are frequently employed in the wholesale trade:—

1 (*Reduced Strained Galbanum.*)—*a.* True galbanum 9 lbs.; strain as above, and when nearly finished, add black resin (clean) 3 lbs.; Venice turpentine 2 lbs.; mix well. *Product.* 12 lbs.—*b.* True strained galbanum and black resin, of each, 6 lbs.; strained assafœtida 1½ oz.; mix, and add Venice turpentine 3 lbs. *Product.* 14½ lbs.

2. (*Factitious Strained Galbanum.*) Black resin 4 lbs.; Venice turpentine 3 lbs.; strained assafœtida 2 oz.; oils of juniper and fennel, of each, ½ oz.; water ¼ pint; mix s. a. The small and waste of the galbanum chests are also usually boiled up, strained, evaporated, and added to the above to improve them.

STRAPPING. Spread adhesive-plaster. *Used* to dress wounds, &c.

STRAW PLAIT *is bleached* by exposing it to the fumes of burning sulphur in a close chest or box, or by immersing it in a weak solution of chloride of lime, and afterwards washing it well in water. Water strongly acidulated with oil of vitriol or oxalic acid, is also used for the same purpose. Straw may be *dyed* with any of the simple liquid dyes.

STRONTIA. *Syn.* STRONTIAN. STRONTITES. OXIDE OF STRONTIUM. The oxide of a metal called strontium. It greatly resembles baryta. Hydrate of strontia is freely soluble in boiling water, and the saturated solution deposites crystals on cooling. The solution exhibits an alkaline reaction, and like baryta is precipitated white by sulphuric acid, and the alkaline sulphates and carbonates. It is distinguished from baryta by its inferior solubility

and by its soluble salts giving a red tinge to flame, while the salts of baryta impart a yellow tinge. The salts of strontia may all be prepared by dissolving the native carbonate in the respective acids. The nitrate is the only one met with in commerce, and is employed to form colored fireworks. The metal *strontium* is obtained in a similar way to barium.

STRYCHNINE. *Syn.* STRYCHNINA. STRYCHNIA, (P. L. & E.) VAUQUELINA. TETANINE. *Prep.* Precipitated from a solution of the sulphate, by ammonia. The sulphate is formed by digesting a watery solution of alcoholic extract of nux vomica with magnesia, pouring off the liquid, and boiling the residue, pressed nearly dry in cloth, in rectified spirit. The spirit having been distilled off, the residue is dissolved in diluted sulphuric acid, and set aside to crystallize. The nitrate and other salts are obtained by dissolving strychnia in the diluted acids, and crystallizing. *** A white powder, soluble in 7000 parts of cold water, to which it imparts intense bitterness; soluble in hot alcohol of 0·850, and deposited in crystals as the solution cools. It is alkaline to test paper; "Nitric acid strongly reddens it; a solution of 10 grs. in fʒiv of water and fʒj of pyroligneous acid, when decomposed by f℥j of concentrated solution of carbonate of soda, yields on brisk agitation a coherent mass, weighing when dry 10 grs., and entirely soluble in solution of oxalic acid." (P. E.) "It melts by heat, and if more strongly urged, is totally dissipated." (P. L.) It is a most dreadful poison, speedily producing tetanus and death. *Dose* of strychnia and its salts, one-twentieth to one-sixteenth of a gr., gradually and cautiously increased till it affects the muscular system; in paralysis, tic douloureux, &c. It is also used externally, ¼ gr. at a time.

STYRAX, STRAINED, (FACTITIOUS.) *Prep.*—1. Balsam of Peru 1 lb.; balsam of tolu 4 lbs.; mix.—2 Gum benzoin 8 lbs.; liquid styrax 6 lbs.; balsam of tolu 3 lbs.; do. of Peru 2 lbs.; N. S. W. yellow gum 7 lbs.; rectified spirit 7 gallons; digest with frequent agitation for a fortnight, strain and distil off the spirit (about 5½ galls.) till the residue has a proper consistence. *Prod.* 24 lbs.—3. Gum benzoin 6 lbs.; gum styrax 3 lbs.; balsam of tolu 2½ lbs.; Socotrine aloes ¾ lb.; rectified spirit 6 galls.; digest and distil as last, and add to the product balsam of Peru 6 oz.; olive oil 4 oz.—4. Liquid storax 1 oz.; balsam of tolu 2 lbs.; rectified spirit q. s.

STYRACINE. A name given by Simon to a crystallizable substance extracted from storax.

SUBERIN. Cork deprived of all its soluble matter by the successive action of water and alcohol. By long boiling in nitric acid, and then evaporating the fluid to one half, it yields crystals of *suberic acid*, which may be purified by re-solution and crystallization. Margaric acid treated in the same way also yields suberic acid. With the bases it forms salts called *suberates*, many of which are soluble.

SUCCINIC ACID. *Syn.* VOLATILE SALT OF AMBER. ACID OF DO. SAL SUCCINI. ACIDUM SUCCINUM, (P. D.) *Prep.* From the impure acid obtained during the distillation of oil of amber, by wrapping it in bibulous paper and submitting it to strong pressure, to remove the oil, and then resubliming it. It may also be prepared from the mother liquor of suberic acid, by evaporation and digesting the resulting crystals in ether, to remove suberic acid. Succinic acid forms salts with the bases termed *succinates.*—*Succinate of ammonia* is used as a test for iron.—*Succinamide* is formed by the action of ammonia water on succinic ether;—*bisuccinamide*, by heating anhydrous succinic acid in dry gaseous ammonia.—*Succinone* is an oily liquid obtained by distilling succinic acid with lime. *Dose.* 5 to 20 grs. as an antispasmodic and diuretic. Seldom used.

SUET. *Syn.* SEVUM; SEBUM, (*Lat.*) This is prepared from the fat of the loins of the sheep or bullock, by melting it by a gentle heat.—*Mutton suet* (Sevum, *P. L.*, Fat, *P. E.*, Adeps ovillus, *P. D.*, Sevum ovillum, Do. præparatum) is used in medicine as the basis of several ointments, cerates, and plasters.

SUET, MELILOT. *Syn.* SEVUM MELILOTI. *Prep.* Suet 8 lbs.; melilot leaves 2 lbs.; boil till crisp and strain. *Used* by farriers, and to make melilot plaster.

SUGAR. *Syn.* SUCRE, (*Fr.*) ZUCKER, (*Ger.*) SACCHARUM, (*Lat.*) The properties and uses of sugar are too well known to require description. It constitutes the sweet portion of animal and vegetable substances. The sugar consumed in England is prepared from the juice of the sugar cane. A similar species of sugar, but of inferior quality, is obtained from the juice of the beet-root and sugar maple. There are also other kinds of sugar procured from grapes and other ripe fruit, (*grape sugar*,) from milk, (*sugar of milk*,) from manna, (*mannite*,) from mushrooms, liquorice root, &c.; and from glue, fecula, sawdust, &c., by the action of dilute sulphuric acid. *Cane, beet*, and *maple sugars* possess the greatest sweetening power, which is more than double that of the other varieties.

Pur. Sugar is largely adulterated. Pure cane and beet sugars may be known by their solutions bending the luminous rays in circumpolarization to the *right*, whereas grape and fecula sugars bend it to the *left*. Pure cane sugar boiled in a solution of caustic potassa remains colorless, but if starch sugar is present the liquid turns brown. (Chevallier.)—A filtered solution of 33 grs. of cane or beet sugar in 1 oz. of water, mixed with 3 grs. of pure caustic potassa, and then agitated with 1½ grs. of sulphate of copper in a close vessel, remains clear, even after the lapse of several days; but if starch sugar is present, a red precipitate is formed after some time, and if present in considerable quantity, the copper will be wholly converted into oxide within 24 hours; the solution first turns blue or green, and then entirely loses its color. (E. Krantz.) Of late years moist sugar has been largely adulterated with the sweet waste liquor (solution of glycyrrhine) of the stearine manufactories; but this fraud may be detected by the inferior sweetness, and by the moist and dirty appearance of such sugar.

SUGAR, ALUM. *Syn.* ALUMEN SACCHARINUM. *Prep.* Powdered alum made into small sugar-loaves, with white of egg and rose-water. *Used* to make an astringent wash.

SUGAR, BARLEY. *Prep.*—1. Saffron 12 grs.; hot water q. s.; infuse till colored, strain, add

white sugar 1 lb.; boil to a full *candy height*, or that state called "*crack*," or "*crackled sugar*," when 2 or 3 drops of clear lemon juice or vinegar must be added, the pan removed from the fire, and set for a minute in cold water to prevent its burning; after which the sugar must be poured out on an oiled marble slab, and either cut into pieces, or rolled into cylinders and twisted as usual. 1 drop of oil of citron will flavor a considerable quantity. Essence of bergamotte or lemons may also be used. **** *White barley sugar* is made with a decoction of barley instead of water, or starch is added to whiten it.

SUGAR, BOILING OR CANDYING. *Proc.* Take any quantity of well clarified and perfectly transparent sirup, and boil it until it has arrived at a *weak candy height*. This is known by dipping the skimmer into the sugar, and touching it between the forefinger and thumb; and immediately on opening them a small thread will be observed drawn between, which will crystallize and break, and remain in a drop on the thumb, which will be a sign of its gaining some degree of smoothness. Boil it again, and it will draw into a larger string; it is now called *bloom sugar*, and must be boiled longer than in the former process. To try its forwardness, dip again the skimmer, shaking off the sugar into the pan; then blow with the mouth strongly through the holes, and if certain bladders go through, it has acquired the second degree: to prove if the liquid has arrived at the state called *feathered sugar*, redip the skimmer, and shake it over the pan, then give it a sudden flirt behind, and the sugar will fly off like feathers. It now arrives at the state called *crackled sugar;* to obtain which the mass must be boiled longer than in the preceding degree; then dip a stick in it, and put it directly into a pan of cold water, draw off the sugar which hangs to the stick in the water, and if it turns hard and snaps, it has acquired the proper degree of crystallization; if otherwise, boil it again until it acquires that brittleness. The last stage of refining this article is called *carmel sugar;* to obtain which it must be boiled longer than in any of the preceding methods; prove it by dipping a stick first into the sugar, and then into cold water, and the moment it touches the latter, it will, if matured, snap like glass. It has now arrived at a *full candy height*. Be careful that the fire is not too fierce, as by flaming up against the sides of the pan, it will burn and discolor the sugar. The boiling is best conducted by steam heat. **** Any flavor or color may be given to the candy by adding the essences or coloring matter to the sirup before boiling. (See CAKE STAINS, p. 153.)

SUGAR CANDY. *Syn.* SACCHARUM CANDUM. *Prep.* Sugar crystallized, by the saturated sirup being left in a very warm place, from 90 to 100° Fahr., and the shooting promoted by placing sticks, or a net of threads, at small distances from each other in the liquor; it is also deposited from compound sirups, and does not seem to retain any of the foreign substances with which they were loaded; it may, however, be colored red by means of cochineal. The differences of color and quality arise from the purity of the sugar employed to make the sirup. Chiefly used as a sweetmeat, and being longer in dissolving than sugar, in coughs to keep the throat moist; it is also blown into the eye, as a very mild escharotic in films or dimness of that organ.

SUGAR, GRAPE. *Syn.* GLUCOSE. DIABETIC SUGAR. STARCH SUGAR. SUGAR OF FRUITS.—*Prep.* 1. (*From grape juice.*) See page 345.—2 *From dried raisins.*) Pound them, wash with cold alcohol, press, dissolve the cake in water, and proceed as last.—3. From diabetic urine, by evaporation, washing the mass in cold alcohol, redissolving in water, and crystallizing.—4. (*From starch.*) Starch 100 parts; water 400 parts; sulphuric acid 1 to 10 parts; boil for 35 or 40 hours, adding water to make up for evaporation; then saturate the acid with lime or chalk, and evaporate. Under pressure, the conversion is produced much quicker. *Prod.* 105 parts. (See FERMENTATION.)—5. (*From woody fibre.*) Shreds of linen or paper 12 parts; strong sulphuric acid 17 do., (Braconnot;—5 of acid and 1 of water, Vogel;) mix in the cold; in 24 hours dilute with water, and boil for 10 hours; then neutralize with chalk, filter, evaporate to a sirup, and set the vessel aside to crystallize. *Prod.* 114% of the weight of the rags. Sawdust, glue, &c., also yield grape sugar by like treatment.

SUGAR, LEMON. *Syn.* PORTABLE LEMONADE. SACCHARUM LIMONATUM. *Prep.* Sugar 4 lbs.; tartaric acid 3 oz.; essence of lemons ¼ oz. *Used* to make lemonade, &c.

SUGAR OF MILK. *Syn.* SACCHARUM LACTIS. LACTINE. *Prep.* Evaporate clarified whey till it crystallizes, and purify the crystals by digestion with animal charcoal and repeated crystallization.

SULPHATE. *Syn.* SULPHAS, (*Lat.*) A saline compound of sulphuric acid, with a base. The *soluble sulphates* may all be recognised by yielding a heavy, white precipitate, with chloride of barium or nitrate of baryta, which is insoluble in acids and alkalis. They also give a similar precipitate with the corresponding salts of lime. An *insoluble sulphate* may be tested by mixing it with 3 times its weight of carbonate of potash or soda, (both in fine powder,) exposing the mixture in a platinum crucible to a red heat for half an hour, dissolving the mass in water, filtering, neutralizing the free alkali with acetic or muriatic acid, and then applying the reagents as before, when an insoluble white precipitate will be formed. The sulphates of baryta, tin, antimony, bismuth, lead, and mercury, are *insoluble;* those of strontia, lime, zirconia, yttria, and silver, very *sparingly soluble;* the other sulphates are *soluble* in water. Mixed with charcoal, and heated to redness, a metallic sulphuret remains.

SULPHOCYANIC ACID. See HYDROSULPHOCYANIC ACID.

SULPHOVINIC ACID. *Syn.* ŒNOTHIONIC ACID. ETHEREO-SULPHURIC DO. BISULPHATE OF OXIDE OF ETHULE. *Prep.* Mix equal weights of sulphuric acid and alcohol, and, in half an hour, add as much carbonate of lead as acid employed; filter, when a solution of sulphovinic acid will be obtained. This, combined with the bases, forms salts called *sulphovinates*, which may be purified by re-solution and crystallization. (See ETHER.)

SULPHOCYANOGEN. *Syn.* BISULPHURET OF CYANOGEN. A light, insoluble, deep yellow powder, discovered by Liebig, and obtained by sat-

urating a concentrated solution of a metallic sulphocyanide with chlorine, or by heating it with nitric acid. (See HYDROSULPHOCYANIC ACID.)

SULPHUR *Syn.* BRIMSTONE. SOUFRE, (*Fr.*) SCHWEFEL, (*Ger.*) SULPHUR, (*Lat.*) This substance is imported from Sicily and Italy, and is a volcanic production. Its general properties are well known. It is an undecompounded substance or chemical element. With oxygen it unites to form *oil of vitriol* and *sulphurous acid*, and with the metals to form *sulphurets.*—SUBLIMED SULPHUR, (*Flowers of Sulphur, Flores Sulphuris, Sulphur sublimatum*, P. L. and E.,) is prepared by subliming sulphur in iron vessels. It is ordered to be washed with water, and dried, (*Sulphur lotum*, P. D.)—STICK, ROLL, or CANE SULPHUR (*Sulphur in bacculis, Do. in rotulis, Do. rotundum*) is melted sulphur cast in moulds.—SULPHUR VIVUM is crude native sulphur. *Dose.* As an alterative ½ dr.; as a purgative 1 to 3 drs.

Pur., Uses, &c. "Pure sublimed sulphur totally evaporates at a heat of 600° F. When washed with water, it (the liquid) does not alter the color of litmus." (P. L.) Sulphur is taken in various chronic skin diseases, pulmonary, rheumatic, and gouty affections, and as a mild purgative in piles, prolapsus ani, &c. Externally, it is extensively used in skin diseases, especially the itch, for which it appears a specific.

SULPHUR, PRECIPITATED. *Syn.* MILK OF SULPHUR. HYDRATE OF DO. LAC SULPHURIS. SULPHUR PRECIPITATUM. *Prep.* Sublimed sulphur 1 part; dry slaked lime 2 parts; water 8 to 12 parts; boil, filter, precipitate by muriatic acid, and drain; well wash, and dry the precipitate. Resembles sublimed sulphur in its general properties, but is much paler, and in a finer state of division.

Remarks. The precipitated sulphur of the shops contains about two-thirds of its weight of sulphate of lime, (plaster of Paris,) owing to the substitution of sulphuric for muriatic acid in the above process. This fraud is detected by heating a little of the suspected sample in an iron spoon or shovel, when the sulphur is volatilized, and leaves behind the sulphate of lime, which, when mixed with water, and gently dried, gives the amount of the adulteration. A still simpler plan is to dissolve out the sulphur with a little hot oil of turpentine or liquor of potassa.

SULPHUR, CHLORIDE OF. *Syn.* HYPOCHLORITE OF SULPHUR. SULPHURIS CHLORIDUM. *Prep.* Spread washed sulphur thinly on the bottom of a wooden box, or other chamber, and pass chlorine slowly over it till fully saturated. This compound has been recommended for internal use by Derksengi, especially in old gouty affections combined with pains in the stomach; and also, with a salutary effect, in severe nervous fever, when it is taken dissolved in ether, in doses of 10 drops, with old Hungary wine. It is used externally in *Psoriasis inveterata.*

SULPHURET. *Syn.* SULPHURETUM, (*Lat.*) Sulphurets are compounds of sulphur with the electro-positive or inflammable bodies. They are either prepared by heating a mixture of the metal and sulphur, in equivalent proportions, in a covered crucible; by igniting a mixture of the metallic oxide and sulphur; by depriving a sulphate of the base of its oxygen, by igniting it in contact with charcoal; or by precipitating a salt of the base by sulphureted hydrogen or a soluble metallic sulphuret. The sulphurets are mostly opaque, brittle, fusible, semi-metallic bodies; those of mercury and arsenic are volatile, and those of the alkalis and the earths soluble in water. The same principles of nomenclature are adopted in describing the sulphurets as are employed to designate the oxides and salts.

SULPHURETS OF ANTIMONY.—1. (*Sesquisulphuret. Sulphuret. Antimonii Sesquisulphuretum*, P. L. *Antimonii Sulphuretum*, P. D.) This is the black antimony of commerce.—2. (*Bisulphuret.*) Formed by transmitting sulphureted hydrogen through a solution of antimonious acid, in muriatic acid. (Rose.)—3. (*Persulphuret.*) As the last, but employing antimonic acid. (Rose.) The golden sulphuret, prepared by dissolving sulphuret of antimony, and sulphur, in a solution of potassa, and precipitating by an acid, is also a persulphuret. (Liebig.)—4. (*Oxysulphuret. Antimonii Oxysulphuretum*, P. L. *Ant. Sulphuretum Aureum*? P. E. *Sulphur Antimoniatum Fuscum*, P. D.) *Prep.* (P. L.) Sesquisulphuret of antimony ℥vij; solution of potassa, 2 quarts; water 2 gallons; simmer for 2 hours, frequently stirring, and adding water to supply that lost by evaporation; filter, precipitate with dilute sulphuric acid, wash, and dry.—5. (*Golden Sulphuret.*) By allowing the solution to cool and deposite its kermes before adding the acid. This is the persulphuret.

Remarks. The oxysulphuret of the pharmacopœia is a deep orange red powder, "totally soluble in nitromuriatic acid, emitting sulphureted hydrogen." (P. L.) It is "tasteless; twelve times its weight of muriatic acid, aided by heat, dissolves most of it, forming a colorless solution, and leaving a little sulphur." (P. E.) The oxysulphuret of the shops has a brighter color than that of the pharmacopœia, and is made by boiling sulphur along with the sesquisulphuret, at the same time using more alkali. It is, in fact, the persulphuret above noticed. (See 3 and 5.) The term *Golden Sulphuret* is wrongly applied by the Ed. College. The *red antimony ore* of mineralogists, *liver, glass*, and *crocus of antimony*, and *Kermes mineral*, are also oxysulphurets of antimony, varying chiefly in color and state of aggregation. *** Oxysulphuret of antimony P. L. is *alterative* in doses of 1 to 4 grs.; *emetic* in doses of 5 to 20 grs.; it is given in skin and liver diseases, glandular enlargements, rheumatism, &c.

SULPHURETED HYDROGEN. *Syn.* HYDROSULPHURIC ACID. SULPHOHYDRIC ACID. HEPATIC GAS. A gaseous compound of hydrogen and sulphur, first chemically examined by Scheele, in 1777. *Prep.*—1. Sesquisulphuret of antimony 1 part; strong muriatic acid, 4 or 5 parts; mix in a glass retort, apply the heat of a spirit-lamp, and collect the evolved gas, either over mercury, or in bottles, like chlorine.—2. From protosulphuret of iron and oil of vitriol, diluted with 4 or 5 parts of water.—3. As the last, but substitute sulphuret of lime or potassium.

Remarks. Sulphureted hydrogen is a colorless gas, possessing a powerful odor of rotten eggs; sp. gr. 1·1912; under a pressure of 17 atmospheres, at 50° it is liquid; it is absorbed by water, forming

liquid sulphureted hydrogen, or *hydrosulphuric acid*. It is a powerful poison. An atmosphere containing 1-1500th of this gas instantly killed a small bird; 1-1000th killed a large dog, and 1-250th a horse. (Dupuytren and Thénard.) Being considerably denser than air, it may be poured from its generating bottle into cavities, a scheme successfully employed by M. Thénard to destroy rats in their holes, a method equally applicable to other vermin. Sulphureted hydrogen may be recognised by the odor, and by its blackening moist carbonate of lead, and tarnishing silver, and also by its precipitating arsenious acid *yellow*, tartar emetic *orange*, and the salts of lead *black*. It forms saline compounds with the alkalis, and the earths termed *Hydrosulphates* or *Hydrosulphurets*, and it precipitates metallic sulphurets from solutions of most of the metals; hence its value as a test. Air containing 1-20,000th part of pure hydrogen will sensibly blacken a piece of white paper, moistened with a solution of acetate of lead. Sulphureted hydrogen is the active ingredient in the *sulphureous mineral waters*.

SULPHURIC ACID. *Syn.* Oil of Vitriol. Vitriolic Acid. Acid Sulphurique, (*Fr.*) Schwefelsäure, (*Ger.*) Acidum Sulphuricum; A. Vitriolicum, (*Lat.*) This acid, which has been known ever since the 7th century, is made by bringing the fumes arising from the slow combustion of sulphur into contact with those evolved from a mixture of nitre and oil of vitriol, so that the former becomes oxidized at the expense of the latter. The process is conducted in a series of leaden chambers, having a little water on the floor, to absorb the acid, and so arranged as to prevent the loss of gas. Sulphuric acid is only made on the large scale. *Fuming*, or *Nordhausen sulphuric acid* is made by distilling calcined sulphate of iron in an earthen retort. By heating this acid in a glass retort, *anhydrous sulphuric acid* distils over.

Prop., Uses, &c. Anhydrous Sulphuric Acid is a white crystalline solid, resembling asbestos; deliquesces and fumes in the air; melts at 66°; boils at about 105°; does not redden dry litmus paper; sp. gr. 1·97 at 78°.—Fuming Sulphuric Acid is an oily, dark brown, fuming liquid; sp. gr. 1·9.—Oil of Vitriol (*Acidum Sulphuricum*, P. L. & E., *A. Sulph. Venale,* P. D.) is a colorless, odorless, acrid, and corrosive liquid, the general properties of which are well known. Its sp. gr. at 60° should never be greater than 1·8455, or less than 1·840. It is immediately colored by contact with organic matter. "It is free from color; sp. gr. 1·845; what remains after the acid is distilled to dryness, does not exceed $\frac{1}{400}$ part of its weight. Diluted sulphuric acid is scarcely colored by sulphureted hydrogen." (P. L.) "Diluted with its own volume of water, only a scanty muddiness arises, and no orange fumes escape." (P. E.) The commercial acid frequently contains nitrous acid, arsenic, and saline matter. The first may be removed by adding about 1½ grs. of sugar to each fluid ounce of the acid, heated to nearly its boiling point, and continuing the heat till the dark color first produced shall have disappeared, when it should be distilled; the *second*, by adding a little sulphuret of barium, or copper-foil, to the acid, agitating the mixture well, and after repose decanting and distilling; the *last* is removed by simple rectification. The distillation is most conveniently conducted, on the small scale, in a glass retort, containing a few platinum chips, and heated by a sand-bath or gas flame, rejecting the first f ℥ss that comes over. (P. E.) The capacity of the retort should be 4 to 8 times as great as the volume of the acid, and connected with a large tubular receiver, by a loosely-fitting glass tube, 4 feet long and 1 to 2 inches in diameter. The receiver should not be surrounded with cold water (Ure.) Fragments of glass may be substituted for platina. The redistilled acid is colorless; density 1·845, (1·842, Ure;) "dilution causes no muddiness; solution of sulphate of iron shows no reddening at the line of contact when poured over it." (P. E.) Sulphuric acid is largely employed in the arts, and from its superior affinity to disengage most of the other acids from their saline combinations. In the diluted state it is used in medicine. When swallowed, it acts as a corrosive poison. The *antidotes* are chalk, whiting, magnesia, carbonate of soda or potash, mixed with water, or any bland diluent. The *tests* for sulphuric acid have been already noticed. (See Sulphate.)

Estim. The strength of sulphuric acid is most correctly ascertained by its power of saturating bases; but in commerce it is usually determined from its sp. gr. See Acidimetry.

Table of the Quantity of Oil of Vitriol and Dry Sulphuric Acid in 100 parts of the Dilute Acid at different Densities, by Dr. Ure.

Liquid.	Sp. Gr.	Dry.	Liq.	Sp. Gr.	Dry.
100	1·8485	81·54	67	1·5648	54·63
99	1·8475	80·72	66	1·5503	53·82
98	1·8460	79·90	65	1·5390	53·00
97	1·8439	79·09	64	1·5280	52·18
96	1·8410	78·28	63	1·5170	51·37
95	1·8376	77·46	62	1·5066	50·55
94	1·8336	76·65	61	1·4960	49·74
93	1·8290	75·83	60	1·4860	48·92
92	1·8233	75·02	59	1·4760	48·11
91	1·8179	74·20	58	1·4660	47·29
90	1·8115	73·39	57	1·4560	46·48
89	1·8043	72·57	56	1·4460	45·66
88	1·7962	71·75	55	1·4360	44·85
87	1·7870	70·94	54	1·4265	44·03
86	1·7774	70·12	53	1·4170	43·22
85	1·7673	69·31	52	1·4073	42·40
84	1·7570	68·49	51	1·3977	41·58
83	1·7465	67·68	50	1·3884	40·77
82	1·7360	66·86	49	1·3788	39·95
81	1·7245	66·05	48	1·3697	39·14
80	1·7120	65·23	47	1·3612	38·32
79	1·6993	64·42	46	1·3530	37·51
78	1·6870	63·60	45	1·3440	36·69
77	1·6750	62·78	44	1·3345	35·88
76	1·6630	61·97	43	1·3255	35·06
75	1·6520	61·15	42	1·3165	34·25
74	1·6415	60·34	41	1·3080	33·43
73	1·6321	59·52	40	1·2999	32·61
72	1·6204	58·71	39	1·2913	31·80
71	1·6090	57·89	38	1·2826	30·98
70	1·5975	57·08	37	1·2740	30·17
69	1·5868	56·26	36	1·2654	29·35
68	1·5760	55·45	35	1·2572	28·54

[Table continued.]

Liq.	Sp. Gr.	Dry.	Liq.	Sp. Gr.	Dry.
34	1·2490	27·72	17	1·1165	13·86
33	1·2409	26·91	16	1·1090	13·05
32	1·2334	26·09	15	1·1019	12·23
31	1·2260	25·28	14	1·0953	11·60
30	1·2184	24·46	13	1·0887	10·41
29	1·2108	23·65	12	1·0809	9·78
28	1·2032	22·83	11	1·0743	8·97
27	1·1956	22·01	10	1·0682	8·15
26	1·1876	21·20	9	1·0614	7·34
25	1·1792	20·38	8	1·0544	6·52
24	1·1706	19·57	7	1·0477	5·71
23	1·1626	18·75	6	1·0405	4·89
22	1·1549	17·94	5	1·0336	4·08
21	1·1480	17·12	4	1·0268	3·26
20	1·1410	16·31	3	1·0206	2·446
19	1·1330	15·49	2	1·0140	1·63
18	1·1246	14·68	1	1·0074	0·8154

SULPHURIC ACID, (DILUTE.) *Syn.* SPIRIT OF VITRIOL. VITRIOL TO CLEAN COPPER. SPIRITUS VITRIOLI. DO. DO. TENUIS. ACIDUM SULPHURICUM DILUTUM. (P. L. E. & D.) *Prep.*—1. (P. L.) Sulphuric acid f℥iss; distilled water f℥xivss; mix. Sp. gr. 1·11.—2. (P. E.) Sulphuric acid f℥j; water f℥xiij; mix. Sp. gr. 1·090. —3. (P. D.) Acid 1 part; water 7 do. Sp. gr. 1·084.—4. (Henry's.) Strong acid diluted to the sp. gr. 1·135. Has the same saturating power as his muriatic and nitric acid. *Used* for assays.—5. (*Common Elixir of Vitriol.*) Water acidulated with oil of vitriol q. s. to render it grateful.

Remarks. fʒj of the dilute acid, P. L., weighs 60·7 grs., saturates 28 grs. of crystallized carbonate of soda, and contains 9½ grs. of oil of vitriol, or 7·7 grs. of dry sulphuric acid. *Dose.* 10 to 30 drops diluted with water, as a refrigerant, to check profuse perspiration, in skin diseases to relieve the itching, in dyspepsia, &c.; it is also used externally.

SULPHURIC ACID, (AROMATIC.) *Syn.* ELIXIR OF VITRIOL. ACID DO. DO. ACIDUM SULPHURICUM AROMATICUM, (P. E. & D.) *Prep.*—1. (P. E.) Oil of vitriol f℥iiiss; rectified spirit 1½ pints; mix, add powdered cinnamon ℥iss; powdered ginger ℥j; digest for 6 days, and filter.—2. (P. L. 1746.) Compound tincture of cinnamon f℥xvj; sulphuric acid ℥iv; mix, and filter.—3. (*Wholesale.*) Compound tincture of cinnamon 1 gallon; oil of vitriol 1 lb.; mix, and in a week filter. *Dose.* 10 to 30 drops, in the same cases as the last preparation.

SULPHURIC ACID, (ALCOHOLIZED.) *Syn.* ACIDUM SULPHURICUM ALCOHOLIZATUM. (P. Cod.) See EAU DE RABEL.

SULPHUROUS ACID. *Syn.* ACIDUM SULPHUROSUM. This acid is freely evolved in the gaseous form when sulphur is burnt in air or dry oxygen, and when the metals are digested in hot sulphuric acid; and, mixed with carbonic acid, when chips of wood, cork, and sawdust, are treated in the same way. The pure acid is best obtained by the action of sulphuric acid on copper or mercury; but for the purposes of the arts, the cheaper methods may be employed. According to Berthier, very pure sulphurous acid may be freely obtained by heating a mixture of 100 parts of black oxide of manganese and 12 or 14 parts of sulphur in a glass retort. The gas should be collected over mercury, or received into water when it forms *liquid sulphurous acid.* Water absorbs 30 times its volume of this gas. *Pure liquid sulphurous acid* can only be obtained by passing the pure dry gas through a glass tube surrounded by a freezing mixture. Its sp. gr. is 1·45; boiling point 14° F.; it causes intense cold by its evaporation. With the bases sulphurous acid forms salts called SULPHITES, (*sulphis*, Lat.) *Use.* To bleach silks, woollens, straw, &c., and to remove vegetable stains and iron-moulds from linen.

SUMACH. This dye-stuff is chiefly used as a substitute for galls. With a mordant of acetate of iron, it gives *gray* or *black*: with tin or acetate of alumina, *yellow* and with sulphate of zinc a yellowish brown; alone it gives a greenish fawn-color.

SUPPOSITORY. *Syn.* SUPPOSITORIUM, (*Lat.*, from *sub*, under, and *pono*, to place.) A medicine placed in the rectum for the purpose of remaining there, and dissolving gradually. The mode of proportioning the doses has been noticed in the article ENEMA.

SUPPOSITORY FOR WORMS. *Syn.* SUP. ANTHELMINTICUM. *Prep.* (Swediaur.) Aloes ʒiv; common salt ʒiij; flour ʒij; honey q. s. to make a stiff mass; divide into proper-shaped pieces weighing 15 grs. each. One to be used after a stool.

SUPPOSITORY FOR PILES. *Syn.* SUP. HÆMORRHOIDALE. S. SEDATIVUM. *Prep.*—1. (Ellis.) Powdered opium 2 grs.; soap 10 grs.; mix. —2. Powdered opium 2 grs.; finely-powdered galls 10 grs.; spermaceti cerate ʒj; mix.—3. Extracts of opium and stramonium, of each 1 gr.; cocoa nut butter ʒij; mix. *Used* when the piles are very painful.

SUPPOSITORY, PURGATIVE. *Syn.* SUP. CATHARTICUM.—1. Soap ʒj; elaterium 2 grs.; mix. As a strong purge.—2. (Nieman.) Soap ʒij; common salt ʒj; honey q. s.; mix. As a mild cathartic.

SUSPENDED ANIMATION, (*from hanging.*) In cases where a body is found in a suspended state, and life is seemingly extinct, the chief remedy consists in cupping the temples or opening the jugular vein, and so relieving the head of the blood which accumulates in its superficial veins in consequence of the ligature. Where the body is cold, from having been long suspended, friction, and the other means used for restoring the animal heat in drowned persons, should be likewise resorted to. Electricity or galvanism may also be of service. See ANIMATION, SUSPENDED, and DROWNING.

SWEINFURTH GREEN. *Syn.* VERT DE MITIS. VIENNA GREEN. *Prep.*—1. Acetate of copper and arsenious acid, equal parts; dissolve each separately in the least possible quantity of boiling water, mix; an olive green precipitate falls, which is a good permanent color; but which, by boiling the liquor from 5 to 8 minutes, changes to a dense granular superb green powder.—2. Instead of boiling the solution containing the precipitate, let it cool and stand for several hours, till the powder assumes a granular and beautiful tint.—3. (Kastner.) Arsenious acid 8 lbs., dissolved in water as before; verdigris 9 or 10 lbs., diffused through

water at 120° and the pap passed through a sieve; mix the latter with the former solution, and set aside till the reaction of the ingredients produces the proper shade.—4. Digest Scheele's green in acetic acid. *⁎* A very fine green pigment. The use of more arsenic turns it on the yellowish green, and boiling it with a small quantity of potash takes off the blue color. The vessel in which the mixed liquids are set aside should be covered to prevent a premature crystallization on the surface. *Scheele's green* is also commonly sold under the name of *Mitis green.*

SYDENHAM'S LENITIVE. *Prep.* Coarsely-powdered rhubarb ʒiij; tamarinds ℥ij; senna ℥ss; coriander seeds ʒij; boiling water 1 pint; macerate for 3 hours, and strain. An excellent stomachic and laxative. *Dose.* 1 to 4 tablespoonfuls or more.

SYNAPTASE. *Syn.* EMULSINE. The white part of sweet and bitter almonds, which is soluble in water. Amygdaline converts it into oil of bitter almonds, and prussic acid. 17 grs. of amygdaline dissolved in f℥j of an emulsion of sweet almonds, yield a liquid containing 1 gr. of anhydrous hydrocyanic acid, which does not require to be distilled. This solution has been proposed as a substitute for dilute prussic acid and bitter almond water. 100 grs. of amygdaline yield 47 grs. of raw oil, and 5·9 grs. of anhydrous hydrocyanic acid. (Liebig.)

SYLVIC ACID. *Syn.* SILVIC ACID. A crystalline substance extracted from resin by weak alcohol, and purified by stronger alcohol. It is distinguished from pinic acid by its insolubility in cold alcohol sp. gr. 0·883. With alkalis it forms salts called *sylvates,* which are soluble in alcohol and ether.

TALLOW AND OTHER FATS are commonly *purified* by melting them along with water, passing the mixed fluids through a sieve, and letting the whole cool slowly, when a cake of cleansed fat is obtained.—*Another plan* is to keep the tallow melted for some time, along with about 2§ of oil of vitriol largely diluted with water, employing constant agitation, and allowing the whole to cool slowly; then to remelt the cake with a large quantity of hot water, and to wash it well.—*Another method* is to blow steam for some time through the melted fat. By either this or the preceding process a *white hard* tallow may be obtained. *Some persons* add a little nitre to the melted fat, and afterwards a little dilute nitric or sulphuric acid, or a solution of bisulphate of potash. Others boil the fat along with water and a little dilute nitric or chromic acid, and afterwards wash it well with water. (See OILS, FIXED.)

TANGHININE. A crystallizable substance extracted by ether from the seeds of Tanghinia Madagascariensis after the fixed oil has been removed by pressure. It is soluble in water, alcohol, and ether; bitter, acrid, and poisonous.

TANNIN. *Syn.* TAN. TANNIC ACID. QUERTANNIC ACID. TANNIN, (*Fr.*) GERBSTOFF, (*Ger.*) ACIDUM TANNICUM, (*Lat.*) A peculiar vegetable principle, named from its power of converting the skins of animals into leather.

Prep. I. By percolation, in a close vessel, from coarsely powdered galls and sulphuric ether, that has been previously agitated with water. In 24 hours the percolated liquid will be found divided into two portions; the lower and heavier being a watery solution of tannic acid, and the upper an ethereal solution of gallic acid and coloring matter. Fresh ether must be passed through the powder as long as the lower stratum of liquid continues to augment. The two fluids are now separated, and after the heavier one has been well washed with ether, it is gently evaporated to dryness; preferably under the receiver of an air-pump, or over sulphuric acid. *Prod.* About 40§.

II. To a hot infusion of galls add a few drops of sulphuric acid, agitate, filter, and precipitate the filtered liquor by sulphuric acid, diluted with half its weight of water; in one hour decant the clear, precipitate with strong sulphuric acid, wash with water acidulated with sulphuric acid, press between the folds of bibulous paper, and dissolve in pure water; gradually add carbonate of lead, and digest till the sulpho-tannate is all decomposed, filter, and evaporate; powder the dry mass, digest in ether, and evaporate the ethereal solution, as before.

III. Precipitate an infusion of galls with a concentrated solution of carbonate of potash, avoiding excess; wash with *ice-cold* water, dissolve in dilute acetic acid, filter, precipitate by acetate of lead, wash the precipitate with water, suspend it in water, decompose it by sulphureted hydrogen, and evaporate the filtered liquid in vacuo or over sulphuric acid.

Props., Uses, &c. The uses of tannin in the preparation of leather are well known. In the pure state it is perfectly white, but acquires a yellow color from the action of the air. It is powerfully astringent, reddens vegetable blues, and by the action of heat on its solution, is converted into ellagic, gallic, and carbonic acids. When heated in the dry state, metagallic and pyrogallic acids are formed. It unites with the bases forming salts called *tannates,* which are characterized by striking a deep black with the persalts of iron, (ink.) Tannic acid and gelatin are mutually used as tests of each other; a thick flocculent precipitate is formed whenever these substances meet in solution. When a solution of tannin is dropped into another of gelatin, thick flocks are precipitated, but redissolve when heated with the supernatant fluid. The following is a useful and simple form for preparing this test:—Infuse 1 oz. of pounded galls in 4 oz. of water for several hours; strain with pressure. Add to the turbid fluid 2 oz. of common salt, and filter. The filtrate retains its transparency and power of precipitating gelatin for years. (Chem. Gaz.) Tannic acid is occasionally employed as an astringent in medicine.

TANTALUM. *Syn.* COLUMBIUM. A rare metal discovered by Mr. Hatchet in 1801 in a mineral from Massachusetts, and by M. Ekeberg in 1803 in tantalite. It exists in most of its ores in combination with oxygen, from which it is separated by fusing the ore with 3 or 4 times its weight of carbonate of potassa, dissolving out the resulting columbate or tantalate of potassa with water, and precipitating by a mineral acid. The precipitate is *hydrated columbic* or *tantalic acid.* It is insoluble in water, but readily unites with the alkalis forming salts termed *columbates* or *tantalates,* which are crystallizable. It is soluble in

hydrofluoric acid, and the solution, by evaporation at 76°, deposites crystals of *terfluoride of Columbium*.—*Metallic Columbium* is best obtained by heating potassium with the double fluoride of potassium and columbium in the way described for silicon. (Berzelius.) — *Oxide of Columbium* is formed by exposing columbic acid, in a crucible lined with charcoal and luted, for 4½ hours to an intense heat. This oxide is insoluble in acids, and by fusion with potash or nitre is converted into columbic acid.

TARRAS. *Syn.* TERRAS. A volcanic product resembling puzzolene that imparts to mortar the property of hardening under water. Several other argillo-ferruginous minerals possess the same power, and are used under this term.

TARTAR, AMMONIATED. *Syn.* TARTRATE OF POTASH AND AMMONIA. AMMONIO-TARTRATE OF POTASSA. *Prep.* Neutralize a solution of cream of tartar with ammonia, evaporate, and crystallize. Very soluble in water. A favorite laxative on the Continent. This is frequently called *soluble* cream of tartar.

TARTAR, BORAXATED. *Syn.* SOLUBLE CREAM OF TARTAR. BOROTARTRATE OF POTASSA. TARTARUS BORAXATUS. CREMOR TARTARI SOLUBILIS. TARTRIS BORAXATA POTASSÆ ET SODÆ. POTASSÆ BOROTARTRAS. *Prep.*—1. Borax 2 lbs.; cream of tartar 5 lbs.; both in powder; dissolve in water, and evaporate.—2. (P. Cod.) Cream of tartar ℥iv; boracic acid ℥j; boiling water lb. ij; dissolve, evaporate without boiling, dry in a stove, and powder. A popular laxative on the Continent.

TARTAR EMETIC. *Syn.* TARTARIZED ANTIMONY. STIBIATED TARTAR. ANTIMONIO-TARTRATE OF POTASH. POTASSIO-TARTRATE OF ANTIMONY. POTASSÆ ANTIMONIO-TARTRAS. TARTARUS EMETICUS, (P. L. 1720.) ANTIMONIUM TARTARIZATUM, (P. L. 1788, 1824, and P. E.) ANTIMONII POTASSIO-TARTRAS, (P. L. 1836.) ANTIMONII ET POTASSÆ TARTRAS sive TARTARUM EMETICUM, (P. D.) *Prep.* I. (P. L.) Sesquisulphuret of antimony and nitre, powdered, of each, lb. ij; add gradually muriatic acid f℥iv, and ignite the powder spread on an iron plate; powder the residue when cold, and wash it with boiling water till the latter passes off tasteless, then mix the powder with bitartrate of potash ℥xiv, and boil for 1 hour in a gallon of water, strain while hot, and set the liquid aside to crystallize, dry the crystals, and again evaporate the liquor and crystallize.

II. (P. E.) Powdered sulphuret of antimony ℥iv; muriatic acid (commercial) 1 pint; dissolve, boil for ½ an hour, filter, and pour the liquid into water 5 pints; collect the precipitate, well wash it with cold water on a filter, and dry it by the heat of a vapor bath; then take of this precipitate (*oxychloride of antimony*) ℥iij; bitartrate of potash ℥iv ʒij; water f℥xxvij; mix, boil for an hour, and set it aside to crystallize as before.

III. (P. D.) Nitromuriatic oxide of antimony (*oxychloride*) 4 parts; powdered bitartrate of potash 5 parts; distilled water 34 parts. As last.

⁂ Finely-divided tartar emetic may be prepared, according to M. Hoffmann, in the following manner:—6 oz. of tartar emetic are dissolved in 32 oz. of *boiling* water, and the solution precipitated with 64 oz. of alcohol. The loss in tartar emetic does not amount to more than half a drachm, and the alcohol is reobtained by distillation. (Jahr. für Prakt. Pharm.)

Remarks. Tartar emetic forms white, transparent crystals, which become opaque by exposure to the air. Its taste is at first sweetish, then astringent, and metallic. It dissolves in 14½ parts of water at 60°, and in 2½ parts at 212°; is insoluble in alcohol, and decomposed by heat. When pure, the crystals and their powder should be *perfectly white*, and the precipitate, formed by adding to its boiling solution a few drops of solution of carbonate of soda, should *not* be redissolved. If it is, the salt is adulterated with cream of tartar. (Hennel.) Pure tartar emetic is "totally soluble in water, no undissolved bitartrate of potash remaining in the vessel, and sulphureted hydrogen being added, a reddish-colored precipitate is obtained. Neither chloride of barium nor nitrate of silver precipitates its (dilute) solution. Nitric acid throws down a precipitate, which is redissolved by excess of the precipitant." (P. L.) "Its solution is not affected by ferrocyanide of potassium. Dissolved in 40 parts of water, the solution is not affected by its own volume of a solution of 8 parts of acetate of lead in 32 parts of water, and 15 parts of acetic acid." (P. E.) For other tests, see ANTIMONY.

Dose. As an expectorant and diaphoretic, one-twelfth to one-sixth of a gr.; as a nauseant, ¼ to ½ gr.; as an emetic, 1 to 3 grs.; as antiphlogistic, ½ to 4 grs. In large doses it is *poisonous*. *Ant.* Tannin, infusion of gall, bark, tea, &c., vomiting being promoted at the same time by drinking copiously of tepid water.

TARTAR, REDUCED. *Syn.* CREMOR TARTARI REDUCTUS. An article is sold under the name of *British cream of tartar*, which contains ¼th its weight or more of bisulphate of potash.

TARTAR, SOLUBLE. *Syn.* TARTARUM SOLUBILE. TARTRATE OF POTASH. POTASSÆ TARTRAS. *Prep.* Water 1 gallon; carbonate of potash 1 lb.; dissolve, add cream of tartar as long as effervescence arises, filter, evaporate, and crystallize. Purgative. *Dose.* 1 dr. to 1 oz.

TARTARIC ACID. *Syn.* CRYSTALLIZED ACID OF TARTAR. ACIDUM TARTARICUM, (P. L. E. & D.) ACIDE TARTARIQUE, (*Fr.*) WEINSTEINSÄURE, (*Ger.*) *Prep.* (P. L.) Cream of tartar lb. iv; boiling water 2 gallons; dissolve by boiling, add gradually chalk ℥xij ʒvij; and when the effervescence ceases, add another like portion of chalk, dissolved in muriatic acid f℥xxviss, or q. s., diluted with water 4 pints; collect the precipitated tartrate of lime, and well wash it with water, then boil it for 15 minutes in dilute sulphuric acid 7 pints and f℥xvij, next filter, evaporate, (to the density 1·38,) and set it aside to crystallize. The crystals must be dissolved and crystallized a second and a third time.

Remarks. On the large scale, the decomposition of the tartar is usually effected in a copper boiler, and that of the tartrate of lime in a leaden cistern. This part of the process is often performed by mere digestion for a few days, without the application of heat, as ordered by the College. Leaden or stoneware vessels are used as crystallizers. Good cream of tartar requires 26§ of chalk, and 28·5§ of dry chloride of calcium for its perfect

decomposition. Dry tartrate of lime requires 75§ of oil of vitriol to liberate the whole of the tartaric acid. A *very slight excess* of sulphuric acid may be advantageously employed. Some manufacturers bleach the colored solution of the first crystals by treating it with animal charcoal; but for this purpose the latter substance should be first purified by digesting it in muriatic acid, and afterwards by edulcorating it with water, and exposing it to a *dull* red heat in a covered vessel. The general management of this manufacture resembles that of citric acid.

Props., Uses, &c. Tartaric acid forms inodorous, sour, scarcely transparent prisms, soluble in 2 parts of water at 60°, and its own weight of boiling water. It contains about 9§ of combined water. It fuses when heated, and after losing ¼th of its water, is converted into *tartralic acid*, and by continuing the heat until another ¼th of its water is driven off, it is converted into *tartrelic acid*; by a higher heat it gives off all its water, and becomes anhydrous and insoluble. By distillation it yields pyrotartaric and pyruvic acids with other products; when strongly heated, it is wholly dissipated. With the bases it forms salts called *tartrates.* Tartaric acid is chiefly employed in calico printing, and in medicine, as a substitute for citric acid and lemon juice, for the preparation of cooling drinks and saline draughts. For the latter purpose, sesquicarbonate of soda is the alkaline salt commonly employed.

20 grs. of crystallized tartaric acid

are saturated by

27 grs. of crystallized bicarbonate of potash.
22 grs. of commercial carbonate of do.
22 grs. of crystallized sesquicarbonate of soda.
38 grs. of do. carbonate of soda.
15½ grs. of do. sesquicarbonate of ammonia.

Pur. and Tests. "Tartaric acid is entirely soluble in water, and the solution throws down bitartrate of potassa from any neutral salt of potassa. The precipitate thrown down by acetate of lead is soluble in nitric acid." (P. L.) By heat it is totally dissipated. Tartaric acid is known to be such by giving white precipitates with solutions of caustic lime, baryta, and strontia, and acetate of lead, which dissolves in excess of the acid. A solution of potash causes a white granular precipitate of cream of tartar, soluble by agitation in excess of the precipitant. Nitrate of silver gives a white precipitate, which, when heated, fumes, and leaves pure metallic silver. At about 570°, all the tartrates are blackened, and yield a peculiar and characteristic odor.

TARTRATE OF IRON. *Prep.* By dissolving the hydrated oxides in a solution of the acid, and evaporating to dryness. The addition of a little ammonia converts either of these salts into the *ammonio-tartrate of the peroxide or protoxide of iron*, as the case may be. (See IRON.)

TARTRALIC ACID. This acid is distinguished from tartaric acid by saturating ¼th less base, and by forming soluble salts with lime and baryta. By heat it is converted into *tartrelic* acid. This new acid possesses only *half* the neutralizing power of tartaric acid. In contact with water the tartralic and tartrelic acids and their salts are reconverted into tartaric acid and tartrates. Dry tartralic, tartrelic, and tartaric acids are isomeric compounds.

TAURINE. Obtained along with choloidic acid and ammonia when bile is boiled with an excess of muriatic acid. It forms white crystalline needles, soluble in water, and sparingly soluble in alcohol.

TEA. This useful article is said to be frequently adulterated, after its arrival in England, with the leaves of other plants; but the only adulteration which is extensively employed at the present day, is mixing it with a certain portion of exhausted tea-leaves, which have been redried and curled. The leaves which have been found in the possession of the manufacturers of imitation tea, are those of the sloe tree, ash tree, elder bush, and white thorn. They are described as having been boiled, in some cases, with logwood, or scalded, then rolled up and dried, the green bloom being given to them by Dutch pink or verditer. The use of sheep's dung, verdigris, or copperas, seems a mere slander. According to Mr. Warrington, a most extensive system of adulteration is practised in China, since the very numerous specimens he has examined have been obtained from sources which renders the fact of their having actually been brought from China indisputable. Many samples are found not to contain a single grain of tea, being made up entirely of other leaves. Green teas are for the most part spurious, being manufactured out of cheap black teas. This fraud seems to be accomplished with great dexterity, and, with the greater care, the higher the price of the green tea it is intended to imitate. From the common green teas the coloring matter may be washed off by agitating the tea with cold water and drying it, when it is at once converted into black tea without the leaf uncurling. On examining it with the microscope, it is seen that a uniform whitish surface is given to it, by means of what appears to be Koalin or porcelain clay, which also very conveniently adds to the weight; upon this a yellow substance, mixed with Prussian blue, is dusted; hence the green color, which may thus be rendered of any tint. Chemical examination detected the presence of sulphate of lime, Prussian blue, and a vegetable yellow-coloring matter, probably turmeric. (Chem. Gaz.) It is a common practice among the grocers in England to impart what they call a "*bloom*" to their green teas by "*rouncing*" them up with a little calcined magnesia, or finely-powdered aluminous earth. The quantity that adheres to the tea is very trifling, but it greatly improves their appearance. This plan is not advisable, as I find the presence of even a very small quantity of magnesia in water lessens its solvent power considerably, and consequently tends to make the leaves produce a weaker infusion. It is a practice of this kind, but carried on for a more dishonest purpose, that is alluded to above by Mr. Warrington. *Pure China tea* is not turned black by being put into water impregnated with sulphureted hydrogen gas, nor does it tinge spirit of hartshorn blue. The infusion is amber-colored, and is not reddened by adding a few drops of oil or spirit of vitriol to it. *_* Among domestic substitutes for tea are—the leaves of speedwell, wild germander, black currants, syringa or mock orange, pur-

ple-spiked willow herb, sweetbrier, cherry tree, sloe, all of which are used for tea, either singly or mixed. In foreign countries a variety of plants are used instead of Chinese tea.

TEARS OF THE WIDOW OF MALABAR. *Prep.* Plain spirit at 18° B. 5 quarts; bruised cloves ½ oz.; bruised mace 48 grs.; digest in a corked carboy for a week, add burnt sugar to impart a slight color, filter, and add white sugar 4½ lbs.; dissolved in distilled or filtered rain water ½ gallon; some add 2 or 3 oz. of orange-flower water. A pleasant liquor.

TEETH, (THE.) An object very subservient to health, and which merits due attention, is the preservation of the teeth; the care of which, considering their importance in preparing the food for digestion, is, in general, far from being sufficiently cultivated. Very few persons, comparatively, wash their mouths in the morning, which ought always to be done. Indeed, this ought to be practised at the conclusion of every meal, where either animal food or vegetables are eaten; for the former is apt to leave behind it a rancid acrimony, and the latter an acidity, both of them hurtful to the teeth. Washing the mouth frequently with cold water is not only serviceable in keeping the teeth clean, but in strengthening the gums, the firm adhesion of which to the teeth, is of the greatest inportance in preserving them sound and secure. (See COSMETICS, DENTIFRICES.)

TELESCOPE. Some remarks connected with this subject will be found under the heads—ACHROMATISM, GLASS, SPECULUM, METAL, &c.

TELLURIUM, (From *tellus*, the earth.) A rare grayish-white metal, found only in small quantities in the metallic state, in the gold mines of Transylvania. It fuses below redness, and volatilizes at a red heat; sp. gr. 6·2578; with oxygen it forms 2 compounds.—OXIDE OF TELLURIUM (*tellurous acid*) is obtained by adding water to the nitric solution, or by evaporating it to dryness; a white powder.—TELLURIC ACID is obtained by deflagrating tellurous acid with nitre, and decomposing the resulting tellurate of potassa.—TELLURETED HYDROGEN (*hydrotelluric acid*) is a gaseous substance formed by acting with muriatic acid on an alloy of tellurium with zinc or tin. It bears some resemblance to sulphureted hydrogen.

TEMPERANCE DRINKS. (See LEMONADE, ORANGEADE, SHERBET, GINGER BEER.)

TERRA COTTA. (*Baked clay.*) This term is applied to statues, architectural ornaments, &c., made of pure white clay, fine sand, and powdered potsherds, slowly dried, and baked to a strong hardness.

TEST FOR ARSENIC. Dr. Baumann recommends for detecting small quantities of arsenic, the suspected body to be triturated with from three to six times its amount of iron-filings, which have been exposed to a red heat, and are known to be free from arsenic, and heating the mixture on charcoal in the reducing flame of the blowpipe. Even with the smallest quantity of arsenic, the odor, at least, is disengaged. (Chem. Gaz.) See ARSENIOUS ACID.

TESTING. The tests both of the purity and presence of the principal articles of commerce will be found in their alphabetical order.

THEINE. *Syn.* THEINA. A peculiar crystallizable azotized substance, extracted from tea. (See CAFFEINE.)

THEBAINE. *Syn.* PARAMORPHIA. A crystalline substance obtained by Thibourmery from an infusion of opium that had had its morphia extracted by acting on it by an excess of lime. The residue dissolved in dilute acid, precipitated by ammonia, and the precipitate dissolved in alcohol or ether, yields pure thebaine on evaporation. It has a sharp metallic taste, is fusible, alkaline, and scarcely soluble in water; with the weak acids it forms salts which do not crystallize. It is distinguished from morphia by not becoming blue on the addition of sesquichloride of iron. 1 gr. injected into the jugular vein of a dog, acts like strychnia, and causes tetanus and death in a few minutes. (Majendie.)

THEOBROMINE. A peculiar principle, obtained by Woskresensky from the nut of the theobroma cacao. It is obtained by digesting the nuts in distilled water, straining the decoction, and mixing it with acetate of lead; after filtration, the oxide of lead being removed with sulphureted hydrogen, the clear liquor is evaporated. A reddish-white powder.

THERMOMETERS. Fahrenheit's thermometer is the one universally employed in England, while Celsius', or the centigrade scale, is used on the Continent. Reaumur's is another scale occasionally employed. As reference to these scales are frequently met with in books, it is useful to know their relative value, and the method of reducing the one to the other. The *boiling-point of water* is indicated by 212° on Fahrenheit's scale, 100° on the centigrade scale, and 80° on that of Reaumur; the *freezing-point of water* marks 32° Fahrenheit, and 0, or zero, on the centigrade or Reaumur. The 0 or zero of Fahrenheit is 32° below the freezing-point of water.

1. To reduce Centigrade degrees to those of Fahrenheit, multiply by 9, and divide by 5, and to the quotient add 32, that is,—

$$\frac{\text{Cent.} \times 9}{5} + 32 = \text{Fahr.}$$

2. To reduce Fahrenheit's degrees to Centigrade:—

$$\frac{\text{Fahr.} - 32 \times 5}{9} = \text{Cent.}$$

3. To reduce Reaumur's to Fahrenheit's:—

$$\frac{\text{Reau.} \times 9}{4} + 32 = \text{Fahr.}$$

4. To convert Fahrenheit's to Reaumur's:—

$$\frac{\text{Fahr.} - 32 \times 4}{9} = \text{Reaumur.}$$

THIONURIC ACID. A white crystalline acid, obtained by the action of sulphurous acid on alloxan. Its saturated solution, heated to the boiling-point, congeals into a semifluid, crystalline mass of uramile.

THORINA. *Syn.* OXIDE OF THORIUM. A primitive earth discovered by Berzelius in 1828. It is obtained from the mineral called *thorite*, by reducing it to powder, digesting in muriatic acid, evaporating to dryness, redissolving in dilute acid, filtering, passing sulphureted hydrogen through the solution, precipitating by pure ammonia, wash-

ing the precipitate with water, dissolving in dilute sulphuric acid, evaporating the solution till only a small quantity of fluid remains, collecting the deposited sulphate of thorina, washing it with water, and heating it to redness. *** White; sp. gr. 9·402; insoluble in all acids except the sulphuric; it is precipitated by caustic alkalis, and by exposure in this state rapidly absorbs carbonic acid, and becomes easily soluble in the acids and alkaline carbonates. Its carbonate and subsalts are also soluble in the alkaline carbonates.—THORIUM, the metallic base of thorina, is obtained by the action of potassium on the chloride of thorium, and washing the resulting mass in water.

TIN. *Syn.* ETAIN, (*Fr.*) ZINN, (*Ger.*) STANNUM, (*Lat.*) JOVE; JUPITER, (*Alc.*) This metal has been known from the most remote antiquity, being mentioned in the books of Moses, (Numb., xxxi. 22,) and by Homer, (Iliad, x. 25,) and other early writers. The ancients obtained it principally, if not solely from Cornwall. The Phœnicians traded with England for this metal, at least 1000 years before the birth of Christ.

Prop., Uses, &c. Tin is only manufactured on the large scale. It melts at 442° F., volatilizes at a white heat, and has the sp. gr. 7·29. It evolves a peculiar odor when rubbed, and when bent backwards and forwards, emits a crackling noise. Its uses in the arts are well known. In medicine 1 to 3 drs. of the filings or powders, made into an electuary with treacle, are given in tapeworm, for 2 or 3 successive mornings, followed by a purge.

Pur., Tests, &c. "It is almost entirely dissolved by muriatic acid, yielding a colorless solution; the precipitate thrown down by potash is white, and soluble in excess of the precipitant." (P. L.) The salts of tin are characterized by the following general properties:—1. Ferro-prussiate of potash gives a white precipitate.—2. Hydrosulphuret of potash, a brown-black with the protoxide; and a golden-yellow with the peroxide.—3. Galls do not affect the solutions of these salts.—4. Corrosive sublimate occasions a black precipitate with the protoxide salts; a white with the peroxide.—5. A plate of lead frequently throws down metallic tin, or its oxide, from the saline solutions. —6. Chloride of gold gives, with the protoxide solutions, the purple precipitate of Cassius.—7. Chloride of platinum occasions an orange precipitate with the protoxide salts.

TIN, IODIDES OF. *Syn.* STANNI IODIDUM. *Prep.*—1. (*Iodide. Protiodide.*) Granulated tin, 2 parts; iodine 5 parts; heat together. A fusible, brownish-red, translucid substance, soluble in water.—2. (*Periodide.*) By dissolving hydrated peroxide of tin in hydriodic acid. Yellow, silky crystals.

TIN MORDANTS. *Prep.* I. (Berthollet.) Nitric acid at 30° B. 8 parts; sal ammoniac 1 do.; dissolve, then add by degrees tin 1 part; and when dissolved, dilute the solution with ¼th of its weight of water.

II. (Poerner.) Nitric acid and water, of each 1 lb.; sal ammonia 1½ oz.; dissolve, then add by very slow degrees pure tin beat into ribands 2 oz.

III. (Scheffer.) Nitric acid and water, of each 2 lbs.; sal ammoniac 2 oz.; pure tin 4½ oz.; as last.

IV. (Hellot.) Nitric acid and water, of each 1 lb.; sal ammoniac 1 oz.; nitre ½ oz.; dissolve, then add by degrees granulated tin 2 oz.

V. (Dambourney.) Muriatic acid, at 17° B., 4 parts; nitric acid, at 30° B., 1 do.; dissolve, and add by degrees, Molucca tin 1 do.

VI. Nitric acid, 30° B., 6 parts; muriatic acid, 17° B., 2 do.; mix, and add by degrees grain tin 1 part.

VII. Aquafortis 8 parts; sal ammoniac, or common salt, 1 part; dissolve, and add grain tin 1 part; as before. This is the common spirit of the dyers.

*** All the above are used for dyeing scarlet. See DYERS' SPIRIT and SCARLET DYE.

TIN, MURIATES OF. *Prep.* I. (*Protochloride* or *Protomuriate of Tin.*) By transmitting muriatic acid gas over grain tin heated in a glass tube. Gray; solid; anhydrous. Or by digesting granulated tin in muriatic acid as long as any hydrogen gas is evolved. This solution is used as a powerful deoxidizing agent. It may be obtained in crystals by evaporation.—2. (*Bichloride of tin. Permuriate of do.*) The pure bichloride is obtained by heating the protochloride in chlorine gas, or by distilling a mixture of 8 parts of grain tin with 24 parts of corrosive sublimate, when a very volatile, colorless liquid comes over, which was formerly called *Libavius' fuming liquor.* A solution of the bichloride or permuriate of tin is obtained by dissolving tin in nitromuriatic acid. This solution is much used by dyers, under the name of *Spirits of Tin, Dyers' Spirits, Tin Mordant,* &c. For this purpose, the acid is best made by mixing 2 parts of muriatic acid with 1 part each of nitric acid and water, all by measure. (Liebig.) The tin should be added by degrees, one portion being allowed to dissolve before adding another; as without this precaution the action is apt to become violent, and peroxide of tin to be deposited. A process which has been highly recommended, and seems preferable to all others, is to prepare a simple solution of the *protochloride,* and to convert it into the *bichloride,* either by the addition of nitric acid and a gentle heat, or by passing chlorine through it.—3. (*Submuriate,* or *oxychloride of tin.*) A white powder, obtained by pouring a large quantity of water on crystallized protochloride of tin.

TIN, OXIDES OF. *Prep.* 1. (*Protoxide.*) Precipitate a solution of chloride of tin by carbonate of potassa; well wash and dry the powder at a heat under 196°, exposed to the air as little as possible. It is also formed on the surface of melted tin. It is soluble in acids and the pure fixed alkalis.—2. (*Sesquioxide.*) By mixing fresh, moist hydrated peroxide of tin with a solution of the neutral protochloride. The sesquioxide falls as a slimy precipitate. (Fuchs.)—3. (*Peroxide of tin. Stannic acid.*) By the action of nitric acid on metallic tin. The white powder must be well washed with water. When heated to low redness, it turns yellow, and becomes anhydrous. It may also be obtained by adding potassa, or an alkaline carbonate, to a solution of perchloride of tin. Obtained in the latter way, it is readily soluble in acids and pure alkalis; its compounds with the latter are sometimes called stannates.

TIN, SULPHURETS OF. *Prep.* 1. (*Protosulphuret.*) A brittle bluish-gray compound,

obtained by agitating melted tin with its own weight of sulphur, in a close vessel.—2. (*Sesqui-sulphuret.*) By heating the protosulphuret along with ½ of its weight of sulphur, to low redness.—3. (*Bisulphuret. Mosaic gold. Aurum Musivum. Do. Mosaicum.*)—*a.* (Berzelius.) Peroxide of tin and sulphur, of each 2 parts; sal ammoniac 1 part; mix, and expose it to a low red heat in a glass or earthenware retort, till sulphurous fumes cease to be evolved.—*b.* (Marquis de Bullion.) Tin and mercury, of each 8 oz.; mix, add to the amalgam sulphur 6 oz.; sal ammoniac 4 oz.; mix well, and expose the mixture for 3 hours on a sand heat so as to render the bottom of the matrass *obscurely red.*—*c.* (Chaptal.) As the last, but expose the matrass to a naked fire, and apply a violent heat, when the mixture will take fire, and a sublimate form in the neck of the matrass, consisting of the most beautiful aurum musivum, in hexagonal plates.—*d.* Tin filings, sulphur, sal ammoniac, equal parts; sublime. *⁎* In these sublimations, if the fire is too great, only a gray sulphuret of tin is obtained. *Used* as a metallic gold color in varnish-work and sealing-wax.

TINNING. *Proc.* 1. Plates or vessels of brass or copper, boiled with a solution of stannate of potassa, mixed with turnings of tin, become, in the course of a few minutes, covered with a firmly-attached layer of pure tin.—2. A similar effect is produced by boiling the articles with tin filings and caustic alkali, or cream of tartar. In the above way chemical vessels made of copper or brass may be easily and perfectly tinned.

TINCTURE. *Syn.* Teinture; Alcoole, (*Fr.*) Tinctura, (*Lat.*, from *tingo*, to dye.) A spirituous solution of animal, vegetable, or mineral substances. The merit of having invented tinctures is usually assigned to Arnoldus de Villa Nova, who was Professor of Medicine at Montpellier, about the end of the thirteenth century. He was the first person who employed alcohol for the purpose of extracting the active principles of vegetable matter. *Prep.* "Tinctures are usually prepared by reducing the solid ingredients to small fragments, coarse powder, or fine powder, macerating them for 7 days or upwards in proof or rectified spirit, straining the solution through linen or calico, (or paper,) and finally expressing the residuum strongly, to obtain what fluid is still retained in the mass. They are also prepared by the method of displacement or percolation." (P. E.) "All tinctures should be prepared in close glass (or stoneware) vessels, and be shaken frequently during the process of maceration." (P. L.) Cooper's patent jars are very convenient for the preparation of tinctures, as they are made with wide mouths, large enough to admit the hand, and yet may be closed in an instant, with as much ease and certainty as an ordinary stoppered bottle. Tinctures are better clarified by repose than by filtration, as in the latter case a considerable portion is retained by the medium, and lost by evaporation. In ordinary cases, it will be sufficient to allow the tincture to settle for a few days, and then to pour off the clear supernatant portion through a funnel loosely choked with a piece of sponge or tow, to keep back any floating fragments of straw or other light substances; after which the remaining foul portion of the liquid may be filtered through paper. When it is absolutely necessary to filter a tincture, and the quantity is large, conical bags should be employed. The filtration should be conducted as rapidly as possible, for the double purpose of lessening the amount lost by evaporation, and the action of the air on the fluid. Tinctures long exposed to the air frequently lose their transparency within a few days after being filtered, owing to the oxidizement and precipitation of some portion of the matter previously held in solution. Resinous and oily tinctures, as those of myrrh, tolu, and lavender, (comp.,) may be usually restored to their former brightness by the addition of a quantity of spirit, equal to that they have lost by evaporation; but many tinctures resist this mode of treatment, and require refiltering. Ethereal tinctures are best prepared by percolation, and should be both made and kept in stoppered bottles.

Uses, &c. Tinctures, from the quantity of alcohol they contain, are necessarily administered in small doses, unless in cases where stimulants are indicated. The most important and useful of them are those that contain very active ingredients, such as the tinctures of opium, foxglove, hemlock, henbane, &c. In many instances, the solvent, even in doses of a few fluid drachms, often acts more powerfully on the living system, than the principles it holds in solution. In ordinary cases, this action, when continued for some time, produces the same deleterious effects as the habitual use of ardent spirits, and often lays the foundation of the pernicious custom of dram-drinking. When the action of a substance is the reverse of stimulant, it cannot with propriety be exhibited in this form, unless the dose be so small that the operation of the spirit cannot be taken into account; as in the tinctures of foxglove and opium, for example. The chief use of this class of preparations, therefore, is to enable infusions and decoctions, to which they are added, to sit lighter on the stomach, or to add to them some active principle which water is incapable of extracting. They are also useful as means of preserving the active ingredients of drugs without alteration.

Qual. The tinctures of the shops are usually very uncertain and inferior preparations. Not only is their manufacture carelessly conducted, without reference to the respective characters of their ingredients, but the ingredients themselves are usually deficient in strength and quantity. It is a general practice among the druggists to substitute a mixture of equal parts of rectified spirit of wine and water, or a spirit of about 26 u. p., for proof spirit; and a mixture of 2 gallons of water with 5 gallons of spirit of wine, for rectified spirit. The dry ingredients are also usually selected from such as are unfit for sale. In some wholesale drug-houses it is a general practice to make *all* their simple tinctures (except those that are of a very active or valuable kind, as laudanum, for instance) with 1 lb. of the dry ingredient to the gallon of spirit. Appearance is the object which is alone aimed at, without reference to quality. If the tincture be perfectly transparent, and has a good color, the conscience of the seller and the stomach of the consumer are alike satisfied. Verily, imagination must be a powerful auxiliary to physic!

TINCTURE OF ACONITE. *Syn.* Tinctura Aconiti Recentis. *Prep.* (P. Cod.) Fresh

eaves of aconite, bruised in a marble mortar, and ·ectified spirit of wine, equal parts; macerate for 15 days, press, and filter. *** In the same way inctures are prepared from the fresh leaves of *belladonna, foxglove, hemlock, henbane, strong-scented lettuce, (lactuca virosa,) stramonium, trailing poison oak, (rhus toxicodendron,) mugwort, (artemisia vulgaris,) colchicum corms, squirting cucumber, (momordica elaterium,) jacobea, white poppy, taraxacum, &c., &c.* These inctures (*preserved vegetable juices, alcoholatures*) are stronger than those prepared from the lried plants, and are not to be used except when xpressly ordered. Another mode of preparing hem is to express the juice from the bruised leaves, udd to it the spirit, and filter. The former method, udopted in the Paris Codex, is preferred by M. Soubeiran as affording more uniform products. See VEGETABLE JUICES.)

TINCTURE OF ALOES. *Syn.* TINCTURA ALOES, (P. L. E. and D.) *Prep.* (P. L.) Aloes, hepatic,) coarsely powdered, ℥j; extract of liquorce ℥iij; water 1½ pints; rectified spirit ½ pint; macerate 4 days. Purgative and stomachic. *Dose.* ½ to 1 oz.

TINCTURE OF ALOES, (COMP.) *Syn.* TINCT. ALOES COMPOSITA, (P. L. and D.) T. ALOES ET MYRRHÆ, (P. E.) ELIXIR PROPRIETATIS. *Prep.* 1. (P. L.) Aloes, (*hepatic,*) coarsely powdered, ℥iv; hay saffron ℥ij; tincture of myrrh 1 quart; macerate 14 days with occasional agitation, and strain. The Dublin College omits the saffron.—2. (*Wholesale.*) Aloes 1 lb.; myrrh ½ lb.; hay saffron 2 oz.; rectified spirit 5 pints; water 3 pints; as last. Purgative, stomachic, and emmenagogue. *Dose.* ½ to 1 dr.

TINCTURE OF AMMONIA, (COMP.) *Syn.* TINCT. AMMONIÆ COMP., (P. L.) SPIRITUS AMMONIÆ SUCCINATUS. *Prep.* (P. L.) Mastich ʒij; rectified spirit f ʒix; macerate till dissolved, pour off the clear, add oil of lavender 14 drops; oil of amber 4 drops; stronger liquor of ammonia 1 pint, and agitate well together. Without the oil of amber this forms *eau de luce*, (aqua luciæ.) Antispasmodic and stimulant. *Dose.* 10 to 40 drops, in hysteria, &c.

TINCTURE OF ANTIMONY. *Syn.* TINCT. ANTIMONII. *Prep.* (P. L. 1745.) Crude antimony lb. ss; salt of tartar lb. j; melt with a strong heat for half an hour, powder while still warm, add rectified spirit 1 quart, and digest for 4 days.

TINCTURE OF ASAFŒTIDA. *Syn.* TINCT. FŒTIDÆ, (P. L. 1745.) T. ASAFŒTIDÆ, (P. L. E. and D.) *Prep.*—1. (P. L.) Asafœtida (small) ℥v; rectified spirit 1 quart; macerate 14 days.—2. (*Wholesale.*) Asafœtida 2 lbs.; boiling water 2 quarts; dissolve, add rectified spirit 1½ gallons, agitate well for 3 or 4 days, then let it settle, and decant the clear. *Dose.* ½ to 2 drs.; in hysteria and flatulent colic.

TINCTURE OF ASAFŒTIDA, (AMMONIATED.) *Syn.* TINCT. ASAFŒTIDÆ AMMONIATA. SP. AMMONIÆ FŒTIDUS. (See SPIRITS.)

TINCTURE OF BALSAM OF PERU. *Syn.* TINCT. BALSAMI PERUVIANI. *Prep.* (P. L. 1788.) Balsam of Peru ℥iv; rectified spirit f ℥xvj; dissolve. Pectoral, stimulant, and fragrant.

TINCTURE OF BALSAM OF TOLU. *Syn.* TINCT. TOLUTANI. T. BALSAMI TOLUTANI, (P. L. and D.) T. TOLUTANA, (P. E.) *Prep.* (P. L.) Balsam of Tolu ℥ij; rectified spirit 1 quart; dissolve. Pectoral and expectorant. *Dose.* ½ to 2 drs. as an adjunct in pectoral mixtures.

TINCTURE OF BELLADONNA. *Syn.* TINCT. BELLADONNÆ. *Prep.*—1. (Bailey.) Dried leaves of belladonna ℥ij; proof spirit f ℥xvj; macerate 20 days.—2. (*Wholesale.*) Dried leaves 1 lb.; proof spirit 1 gallon; macerate 14 days. *Dose.* 15 to 40 drops.

TINCTURE OF BENZOIN. *Syn.* PECTORAL BALSAM OF HONEY. TINCT. OF BENJAMIN. T BENZOINI. T. BENZOES. *Prep.*—1. (P. Cod.) Gum benzoin ℥iv; rectified spirit 1 pint; macerate 6 days.—2. To the last add liquid storax ʒvj; essence of jasmine ʒij; oil of rhodium ʒss; musk 12 grs.; civet 9 grs. *Used* to perfume clothes, to evaporate in sick rooms, mixed with rose water to make extemporaneous milk of roses, and in doses of 5 to 10 drops as a pectoral and antispasmodic.

TINCTURE OF BENZOIN, (COMPOUND.) *Syn.* FRIAR'S BALSAM. VERVAIN'S DO. WOUND DO. THE COMMANDER'S DO. BALSAM FOR CUTS. WADE'S DROPS. JESUIT'S DO. COMPOUND TINCT. OF BENJAMIN. BAUME DE COMMANDEUR. BALSAMUM TRAUMATICUM, (P. L. 1745.) TINCT. BENZÖES COMP., (P. L. 1788.) T. BENZOINI COMP., (P. L. 1809, and since, P. E. and D.) *Prep.*—1. (P. L.) Gum benzoin ℥iiiss; strained storax ℥iiss; balsam of tolu ʒx; aloes (hepat.) ʒv; rectified spirit 1 quart; macerate with frequent agitation for 14 days. This produces a most beautiful tincture, truly balsamic; the following is, however, very generally substituted in the wholesale trade.—2. Gum benzoin 4 lbs.; aloes (lively colored) 1¼ lb.; liquid storax 1 lb.; balsam of tolu ¼ lb.; powdered turmeric (best) 6 oz.; rectified spirit 5½ gallons; digest with frequent agitation for 10 days, then add water 1½ gallons; again digest for 4 days, and after 24 hours' repose, decant the clear. Very fine colored. *Dose.* 10 drops to 2 drs., as a stimulating expectorant in chronic coughs. It is also used to stop the bleeding from cuts, &c.

TINCTURE OF BUCHU. *Syn.* TINCT. BUCKU, (P. E.) T. BUCHU, (P. D.) *Prep.* (P. E.) Buchu leaves ℥v; proof spirit 1 quart; macerate 7 days, or percolate. *Dose.* 1 to 4 drs., as a tonic, sudorific, and diuretic. It is inferior to the fresh infusion.

TINCTURE OF CALUMBA. *Syn.* TINCT. CALUMBÆ, (P. L. and E.) T. COLUMBÆ, (P. D.) *Prep.* (P. L.) Calumba root ℥iij; proof spirit 1 quart; digest for 14 days. The P. E. says this tincture is more conveniently prepared by percolation.—This tincture is commonly made with 1 lb of Calumba root to the gallon of a mixture of equal parts of rectified spirit and water. *Dose.* 1 to 2 drs., as a stomachic bitter and tonic, usually joined with soda or chalybeates.

TINCTURE OF CAMPHOR. *Syn.* SPIRITS OF WINE AND CAMPHOR. CAMPHORATED SPIRIT TINCT. CAMPHORÆ, (P. L. E. and D.) SPIRITUS CAMPHORATUS, (P. D.) *Prep.* Camphor ℥v; rectified spirit 1 quart; dissolve. Stimulant and anodyne. *Dose.* 10 to 60 drops. Also as a liniment for sprains, bruises, chronic rheumatism, &c.

TINCTURE OF CAMPHOR, (COMPOUND.) *Syn.* PAREGORIC ELIXIR. CAMPHORATED TINCTURE OF OPIUM. ELIXIR PAREGORICUM,

(P. L. 1745.) TINCT. OPII CAMPHORATA, (P. L. 1788, P. E. and D.) T. CAMPHORÆ COMPOSITA, (P. L. 1809, and since.) *Prep.*—1. (P. L.) Camphor ℈iiss; powdered opium and benzoic acid, of each 72 grains; oil of aniseed f ʒj; proof spirit 1 quart; macerate for 14 days. The oil of aniseed was omitted in the P. L. 1824, but restored in 1836. —2. (*Wholesale.*) Powdered opium 3 oz.; benzoic acid, camphor, and oil of aniseed, of each 2 oz.; rectified spirit and water, of each 3 gallons; digest with agitation a week. An excellent pectoral and anodyne where there are no inflammatory symptoms. *Dose.* 1 to 3 drs. in troublesome coughs, &c. f ℥j contains nearly 1 gr. of opium.

TINCTURE OF CANTHARIDES. *Syn.* TINCT. LYTTÆ, (P. L. 1809.) T. CANTHARIDIS, (P. L. 1824.) *Prep.*—1. (P. L.) Powdered cantharides ℥ss; proof spirit 1 quart; macerate for 14 days.—2. (*Wholesale.*) Powdered cantharides 2 oz.; rectified spirit and water, of each ½ gallon; as last. *Dose.* 10 drops gradually raised to f ʒj, in any bland liquid. *** This tincture should be used with caution. The Ed. College recommends it to be prepared by displacement.

TINCTURE OF CAPSICUM. *Syn.* TINCT. CAPSICI, (P. L. E. and D.) *Prep.* (P. L.) Capsicum, bruised, ʒx; proof spirit 1 quart; digest 14 days, (or percolate, P. E.) *Dose.* 10 to 60 drops; in scarlet fever, ulcerated sore throat, &c. It is also made into a gargle.

TINCTURE OF CARDAMOMS. *Syn.* TINCT. CARDAMOMI, (P. L. and E.) *Prep.* (P. L.) Bruised cardamom seeds ℥iiiss; proof spirit 1 quart; digest for 14 days, (or percolate, P. E.) *** The shells should be sifted from the seeds before maceration, and they are preferably ground in a pepper mill instead of pounding. Aromatic and carminative. *Dose.* 1 to 2 drs. as an adjunct to purgative mixtures.

TINCTURE OF CARDAMOMS, (COMPOUND.) *Syn.* STOMACHIC TINCTURE. TINCT. CARDAMOMI COMPOSITA. (P. L. E. & D.) *Prep.* 1. (P. L.) Cardamom and caraway seeds, of each ʒiiss; cinnamon ʒv; cochineal ʒj; raisins (stoned) ℥v; proof spirit 1 quart; macerate 14 days, (or percolate, P. E.) 2. (*Wholesale.*) Cardamom and caraway seeds, of each 4 oz.; cochineal (S. G.) 6 oz.; cassia 8 oz.; raisins 5 lbs.; proof spirit 4 gallons, (or rectified spirit and water, of each 2 gallons;) macerate as last. *** The Dublin College omits the cochineal and raisins. The order of the London College to stone the raisins, is seldom adopted in practice. If it were necessary, a better plan would be to use sultana raisins, which have no stones. *Dose.* 1 to 4 drs. as a cordial and stomachic, but chiefly as an adjunct, for its color and flavor.

TINCTURE OF CASCARILLA. *Syn.* TINCT. CASCARILLÆ, (P. L. E. & D.) T. CROTONIS ELEUTHERIÆ. *Prep.* (P. L.) Cascarilla ℥v; proof spirit 1 quart; macerate 14 days, (or percolate, (P. E.) An excellent tonic and stomachic; chiefly employed as an adjunct to mixtures, &c. *Dose.* 1 to 2 drs.

TINCTURE OF CASSIA. *Syn.* TINCT. CASSIÆ. *Prep.* (P. E.) Cassia ℥iiiss; proof spirit 1 quart; macerate for 7 days, or percolate. Stomachic. *Dose.* 1 to 2 drs.

TINCTURE OF CASTOR. *Syn.* TINCT. CASTOREI, (P. L. & E.) T. CASTOREI ROSSICI, (P. D.) *Prep.* Castor ℥iiss; rectified spirit 1 quart; macerate 14 days, (or percolate.) *** The Dublin College orders Russian castor, but the scarcity and high price of that variety preclude its use. The tincture of the shops is usually made with only 8 oz. of castor to the gallon. *Dose.* 20 drops to f ʒij, as an antispasmodic; in hysteria, epilepsy, &c.

TINCTURE OF CASTOR, (AMMONIATED.) *Syn.* TINCT. CASTOREI AMMONIATA, (P. E.) T. CASTOREI COMP. *Prep.* (P. E.) Castor ℥iiss; asafœtida ʒx; spirit of ammonia 1 quart; digest 7 days. Stimulant and antispasmodic. *Dose* and *use* as last. *** This is the *Elixir Fœtidum* of For. Ph., and with the addition of ℥ss of opium, forms the *Elixir Uterinum*, or *Elixir Castorei Thebaicum.*

TINCTURE OF CATECHU. *Syn.* TINCT. CATECHU, (P. L. E. & D.) T. JAPONICA. *Prep.* 1. (P. L.) Catechu ℥iiiss; bruised cinnamon ℥iiss; proof spirit 1 quart; macerate 14 days, (or percolate, P. E.) 2. (*Wholesale.*) Catechu 1½ lbs.; oil of cassia ʒj; rectified spirit and water, of each 1 gallon; macerate 10 days. *Dose.* 1 to 2 drs., as an astringent; in diarrhœa, &c., combined with chalk.

TINCTURE OF CHAMOMILES. *Syn.* TINCT. ANTHEMIDIS. *Prep.* Chamomile flowers 1 lb.; proof spirit 1 gallon; macerate 10 days. Stomachic and tonic. *Dose.* 1 to 3 drs.

TINCTURE OF CINCHONA. *Syn.* TINCT. OF BARK. T. CINCHONÆ, (P. L. E. & D.) T. CORTICIS PERUVIANI. *Prep.* (P. L.) Yellow cinchona bark ℥viij; proof spirit 1 quart; macerate for 14 days, (or percolate, P. E.) *** The Dublin College orders pale bark, and the Edinburgh, either species, according to prescription. Tonic and stomachic. *Dose.* 1 to 3 drs.

TINCTURE OF CINCHONA, (COMPOUND.) *Syn.* COMPOUND TINCTURE OF BARK. HUXHAM'S DO. TINCT. CINCHONÆ COMPOSITA, (P. L. E. & D.) T. CORTICIS PERUVIANI COMP. *Prep.* 1. (P. L.) Pale bark ℥iv; dried orange-peel ℥iij; serpentary root ʒvj; hay saffron ʒij; cochineal ʒj; macerate 14 days, (or percolate, P. E.) 2. (*Wholesale.*) Pale bark 3 lbs.; dried orange-peel 2 lbs.; serpentary root 4 oz.; hay saffron 1 oz.; cochineal ½ oz.; proof spirit 4 gallons, (or rectified spirit and water, of each 2 gallons;) macerate 14 days. *** The P. E. orders yellow bark. *Dose* and *use* as the last.

TINCTURE OF CINNAMON. *Syn.* TINCT. CINNAMOMI, (P. L. E. & D.) *Prep.* Cinnamon ℥iiiss; proof spirit 1 quart; macerate 14 days, (or percolate, P. E.) In the shops cassia is usually substituted for cinnamon, and spirit 26 u. p. for proof spirit. *Dose.* 1 to 4 drs., as a cordial, aromatic, and stomachic.

TINCTURE OF CINNAMON, (COMPOUND.) *Syn.* TINCT. CINNAMOMI COMPOSITA, (P. L. & E.) T. AROMATICA, (P. L. 1745.) *Prep.* 1. (P. L.) Cinnamon ℥j; cardamoms ℥ss; long pepper and ginger, of each ʒiiss; proof spirit 1 quart; digest 14 days, (or percolate, P. E.) The P. E. omits the ginger. The following form is used by many wholesale houses:—2. Cassia ¾ lb.; cardamoms, long pepper, and ginger, of each ¼ lb.; oil of cassia ʒss; proof spirit 4 gallons, (or spirits

of wine and water, of each 2 gallons.) Cordial and aromatic. *Dose.* 1 to 2 drs.

TINCTURE OF CLOVES. *Syn.* TINCT. CARYOPHILLI. *Prep.* (P. Cod.) Cloves ℥iv; rectified spirit (sp. gr. 0·863) 1 pint; digest 7 days. Aromatic and stomachic. *Dose.* 10 to 60 drops, as an adjunct.

TINCTURE OF COLCHICUM, (SEEDS.) *Syn.* TINCTURE OF MEADOW SAFFRON. TINCT. COLCHICI, (P. L. & E.) T. SEMINUM COLCHICI, (P. D.) *Prep.* (P. L.) Meadow saffron seeds, bruised, (ground in a coffee-mill, P. E.,) ℥v; proof spirit 1 quart; macerate 14 days, (or percolate, P. E.) *Dose.* f℈ss to ℈j, in gout, &c.

TINCTURE OF COLCHICUM, (EXTRACT.) *Syn.* TINCT. COLCHICI EXTRACTI. *Prep.* (Bateman.) Extract of colchicum 8 grs.; proof spirit f℥j; dissolve and filter.

TINCTURE OF COLCHICUM, (FLOWERS.) *Syn.* DR. WILSON'S EAU MEDICINALE. TINCT. FLORUM COLCHICI. *Prep.* Fresh expressed juice of meadow saffron flowers 2 parts; brandy 1 part; shake well together, and in a few days decant the clear.

TINCTURE OF COLCHICUM, (COMP.) *Syn.* TINCT. COLCHICI COMP., (P. L. 1836.) SPIRITUS COLCHICI AMMONIATUS, (P. L. 1824.) *Prep.* (P. L.) Colchicum seeds (as above) ℥v; aromatic spirit of ammonia 1 quart; digest 14 days. *Dose.* f℈ss to f℈j; in gout, &c.

TINCTURE OF CUBEBS. *Syn.* TINCT. CUBEBÆ. T. PIPERIS CUBEBÆ, (P. D.) *Prep.* (P. L.) Cubebs ℥v; rectified (proof, P. D.) spirit 1 quart; digest 14 days. *Dose.* 1 to 2 drs., three times a day, in diseases of the urinary organs, &c.

TINCTURE OF CUSPARIA. *Syn.* TINCT. CUSPARIÆ, (P. E.) T. ANGOSTURÆ, (P. D.) T. BONPLANDIÆ TRIFOLIATÆ. *Prep.* (P. E.) Angostura bark ℥ivss; proof spirit 1 quart; digest or percolate. Tonic, stimulant, and stomachic. *Dose.* 1 to 2 drs.

TINCTURE OF DIGITALIS. *Syn.* TINCT. OF FOXGLOVE. T. DIGITALIS, (P. L. E. & D.) Dried foxglove leaves ℥iv; proof spirit 1 quart; digest 14 days, (or percolate.) Sedative, diuretic, and narcotic. *Dose.* 10 to 40 drops. In fever, dropsy, phthisis, asthma, &c.

TINCTURE OF ERGOT. *Syn.* TINCT. ERGOTÆ. T. SECALIS CORNUTI. *Prep.* (Apothecaries' Hall.) Ergot (ground in a coffee-mill) ℥ij; proof spirit 1 pint; digest 7 days. *Dose.* A teaspoonful, to excite the action of the uterus in labor.

TINCTURE OF GALBANUM. *Syn.* TINCT. GALBANI. *Prep.* (P. D.) Galbanum ℥ij; proof spirit f℥xxxij; digest 7 days. Stimulant and antispasmodic. *Dose.* 1 to 3 drs.

TINCTURE OF GALLS. *Syn.* TINCT. GALLÆ, (P. L.) T. GALLARUM, (P. E. & D.) *Prep.* (P. L.) Bruised galls ℥v; proof spirit 1 quart; digest 14 days, (or percolate, P. E.) Astringent. *Dose.* ½ to 2 drs. Chiefly used as a test for iron.

TINCTURE OF GENTIAN, (COMP.) *Syn.* TINCT. GENTIANÆ COMP., (P. L. E. & D.) T. AMARA, (P. L. 1745.) *Prep.* 1. (P. L.) Gentian root, sliced and bruised, ℥iiss; dried orange-peel ℥x; cardamom seeds ℨv; proof spirit 1 quart; digest 14 days, (or percolate, P. E.) The Edinburgh College substitutes canella for cardamoms, and adds cochineal ℨss. 2. (*Wholesale.*) Gentian 2 lbs.; dried orange-peel 1 lb.; bruised cardamoms ¼ lb.; proof spirit 4 gallons, (or rectified spirit and water, of each 2 gallons;) digest as last.

TINCTURE OF GINGER. *Syn.* TINCT. ZINGIBERIS, (P. L. E. & D.) *Prep.* 1. (P. L.) Coarsely-powdered ginger ℥iiss; rectified spirit 1 quart; macerate for 14 days, (or percolate, P. E.) 2. (*Wholesale.*) Coarsely-powdered bleached Jamaica ginger 1¼ lb.; rectified spirit (or spirit distilled from the essence) 1½ gallons; water ½ gallon; digest as above. Stimulant and carminative *Dose.* 1 to 2 drs.

TINCTURE OF GUAIACUM. *Syn.* TINCT. GUAIACI, (P. L. E. & D.) *Prep.* (P. L.) Gum guaiacum ℥vij; rectified spirit 1 quart; digest 14 days. *Dose.* 1 to 4 drs.; in chronic rheumatism, gout, &c.

TINCTURE OF GUAIACUM, (COMPOUND.) *Syn.* VOLATILE TINCTURE OF GUAIACUM. AMMONIATED DO. TINCT. GUAIACINA VOLATILIS, (P. L. 1745.) T. GUAIACI COMP., (P. L. 1836.) T. GUAIACI AMMONIATA, (P. E. & D.) *Prep.* (P. L.) Guaiacum in coarse powder ℥vij; aromatic spirit of ammonia 1 quart; digest 14 days. A powerful, stimulating sudorific and emmenagogue, in chronic rheumatism, gout, &c.

TINCTURE, HATFIELD'S. *Prep.* Gum guaiacum and soap, of each ℨij; rectified spirit 1 pint; digest for a week.

TINCTURE OF (BLACK) HELLEBORE. *Syn.* TINCT. HELLEBORI, (P. L.) *Prep.* Black hellebore ℥v; proof spirit 1 quart; digest 14 days. Emmenagogue. *Dose.* ½ to 1 dr.

TINCTURE OF (WHITE) HELLEBORE. *Syn.* TINCT. VERATRI. T. HELLEBORI ALBI. T. VERATRI ALBI. *Prep.* (P. E.) White hellebore ℥iv; proof spirit 1 pint; digest or percolate. *Dose.* 10 drops 2 or 3 times a day, gradually increased, in gout and rheumatism.

TINCTURE OF HEMLOCK. *Syn.* TINCT. CONII, (P. L. E. & D.) T. CICUTÆ. *Prep.* 1. (P. L.) Dried hemlock leaves ℥v; cardamom seeds ℥j; proof spirit 1 quart; digest 14 days.—2. (P. E.) Fresh leaves ℥xij, express the juice, and percolate the residue with tincture of cardamoms f℥x; rectified spirit 1½ pints; mix the liquids, and filter. Deobstruent and narcotic. *Dose* of the P. L. 20 to 60 drops.

TINCTURE OF HEMP, (INDIAN.) *Syn.* TINCT. CANNABIS. *Prep.* (O'Shaughnessy.) Alcoholic extract of Indian hemp 24 grs.; proof spirit f℥j; dissolve. *Dose.* 10 drops every ½ hour in cholera; ℨj every ½ hour in tetanus till the paroxysms cease, or catalepsy is induced.

TINCTURE OF HENBANE. *Syn.* TINCT. HYOSCYAMI, (P. L. E. & D.) *Prep.* (P. L.) Dried henbane leaves ℥v; proof spirit 1 quart; digest 14 days, (or percolate, P. E.) Anodyne, sedative, soporific, and narcotic. *Dose.* f℈ss to ℨij. *** The tinctures of henbane, foxglove, hemlock, hops, jalap, lobelia inflata, rhatany, savin, squills, senna, valerian, wormwood, &c., are usually prepared by the druggists with 1 lb. of the dried leaves to each gallon of a mixture of equal parts of rectified spirit and water.

TINCTURE OF HOPS. *Syn.* TINCT. LU-

PULI, (P. L.) T. HUMULI, (P. D.) *Prep.* (P. L.) Hops ℥vj; proof spirit 1 quart; digest 14 days. Anodyne, sedative, and soporific. *Dose.* ½ to 2 drs.

TINCTURE, HUDSON'S. *Prep.* Tinctures of myrrh and cinchona, and cinnamon water, equal parts, with a little arquebusade and gum arabic. *Used* as a cosmetic for the teeth.

TINCTURE OF IODINE. *Syn.* TINCT. IODINII, (P. D.) T. IODINEI, (P. E.) *Prep.*—1. (P. D.) Iodine ℥j; rectified spirit ℥x; dissolve. Majendie and the Paris Codex order the same proportions.—2. (P. E.) Iodine ℥j; rectified spirit f℥xvj; dissolve. *Dose.* 5 to 30 drops where the use of iodine is indicated.

TINCTURE OF IODINE, (COMPOUND.) *Syn.* TINCT. IODINII COMP. *Prep.* (P. L.) Iodine ℥j; iodide of potassium ℥ij; rectified spirit 1 quart; dissolve. *Dose.* 10 drops, gradually increased to 1 dr. where the use of iodine is indicated.

TINCTURE OF IPECACUANHA. *Syn.* TINCT. IPECACUANHÆ. *Prep.* (P. Cod.) Ipecacuanha ℥j; rectified spirit f℥v; digest.

TINCTURE OF ACETATE OF IRON. *Syn.* TINCT. FERRI ACETATIS. *Prep.* (P. D.) Acetate of potash 2 parts; sulphate of iron 1 do.; triturate together, dry, digest in rectified spirit 26 parts, for 7 days, and decant the clear. *Dose.* ½ to 1 dr., as a chalybeate tonic.

TINCTURE OF ACETATE OF IRON, (ALCOHOLIC.) *Syn.* TINCT. FERRI ACETATIS CUM ALCOHOLE. *Prep.* (P. D.) Sulphate of iron and acetate of potassa, of each ℥j; alcohol 1 quart, (wine measure;) proceed as last, and digest for 24 hours. *Dose* and *use* as the last.

TINCTURE OF IRON, (AMMONIATED.) *Syn.* MYNSICHT'S TINCTURE OF IRON. TINCTURE OF AMMONIO-CHLORIDI OF IRON. T. FERRI AMMONIO-CHLORIDI, (P. L.) T. FERRI AMMONIATI. *Prep.* (P. L.) Ammonio-chloride of iron ℥iv; proof spirit 1 pint; dissolve. *Dose.* 20 to 60 drops, as a stimulant, chalybeate tonic.

TINCTURE OF SESQUICHLORIDE OF IRON. *Syn.* TINCT. OF MURIATE OF IRON. T. FERRI SESQUICHLORIDI, (P. L.) T. FERRI MURIATIS, (P. E.) LIQUOR FERRI MURIATIS, (P. D.) *Prep.* (P. L.) Sesquioxide of iron ℥vj; muriatic acid 1 pint; digest in glass for 3 days, frequently shaking, then add rectified spirit 3 pints, and decant. A ferruginous tonic. *Dose.* 10 to 30 drops, gradually increased. *** In the old *Tinctura Martis*, P. L., iron filings, and in the *T. Ferri muriatis*, P. E. 1817, black oxide of iron, were used instead of the sesquioxide or carbonate.

TINCTURE OF SESQUINITRATE OF IRON. *Syn.* TINCT. FERRI SESQUINITRATIS. DO. DO. PERSESQUINITRATIS. *Prep.* (Onion.) Iron filings ℥ss; nitric acid (1·5) ℥ij ʒij; dissolve, add muriatic acid (1·16) ʒvj; simmer for 2 or 3 minutes, cool, add rectified spirit ℥viij, and filter. Proposed as a substitute for the last preparation. *Dose* the same.

TINCTURE OF JALAP. *Syn.* TINCT. JALAPÆ, (P. L. E & D.) T. JALAPII, (P. L. 1788.) *Prep.* (P. L.) Bruised jalap-root ℥x; proof spirit 1 quart; digest 14 days, (or percolate, P. E.) Cathartic. *Dose.* 1 to 4 drs.

TINCTURE OF KINO. *Syn.* TINCT. KINO, (P. L. E. & D.) *Prep.* Kino ℥iiiss; rectified spirit 1 quart; macerate 14 days. Astringent. *Dose.* 1 to 2 drs. combined with chalk mixture in diarrhœa, &c.

TINCTURE OF LACTUCARIUM. *Syn.* TINCT. LACTUCARII. *Prep.* (P. E.) Powdered lactucarium ℥iv; proof spirit 1 quart; digest or percolate. Anodyne, soporific, antispasmodic, and sedative. *Dose.* 20 to 60 drops. ♏x contain 1 gr. of lactucarium.

TINCTURE OF LAVENDER, (COMPOUND.) *Syn.* LAVENDER DROPS. RED DO. RED LAVENDER. RED HARTSHORN. TINCT. LAVANDULÆ COMPOSITA, (P. L.) SPIRITUS LAVANDULÆ COMPOSITUS, (P. E. & D.) *Prep.*—1. (P. L.) Spirit of lavender 1½ pints; spirit of rosemary ½ pint; red sanders wood (rasped) ʒv; cinnamon and nutmegs, of each ʒiiss; macerate 14 days.—2. (*Wholesale.*) Oil of cassia ¾ oz.; oil of nutmegs 1 oz.; oils of lavender and rosemary, of each 4½ oz.; red sanders (rasped) 3 lbs.; proof spirit 6 gallons, (or rectified spirit and water, of each 3 gallons;) digest 14 days. Should it be cloudy, add a little more proof spirit. Stimulant, cordial, and stomachic. *Dose.* 1 to 3 teaspoonfuls (½ to 2 drs.) in lowness of spirits, faintness, flatulence, hysteria, &c.

TINCTURE OF LOBELIA. *Syn.* TINCT. OF INDIAN TOBACCO. T. LOBELIÆ, (P. E.) T. LOBELIÆ INFLATÆ. *Prep.* (P. E.) Dried and powdered lobelia inflata ℥v; proof spirit 1 quart; digest or percolate. *Dose.* As an expectorant, 10 to 60 drops; as an emetic and antispasmodic fʒj to fʒij, every third hour till it causes vomiting. It is principally employed in spasmodic asthma, and some other pulmonary affections.

TINCTURE OF LOBELIA, (ETHEREAL.) *Syn.* TINCT. LOBELIÆ ÆTHEREA. *Prep.* 1. (P. E.) Powdered lobelia inflata ℥v; spirit of sulphuric ether 1 quart; digest or percolate in a close vessel. —2. (Whitlaw.) Lobelia lb. j; rectified spirit and spirit of nitric ether, of each 2 quarts; macerate for 14 days in the dark. *Use* and *doses* as the last.

TINCTURE OF LUPULINE. *Syn.* TINCT. LUPULINÆ. T. LUPULI, (P. E.) *Prep.* The yellowish brown powder attached to the scales of hops, separated by friction and sifting, ℥v; rectified spirit 1 quart; digest or percolate. *Dose.* fʒss to fʒij. (See TINCTURE OF HOPS.)

TINCTURE OF MUSK. *Syn.* TINCT. MOSCHI. *Prep.* (P. D.) Musk ʒij; rectified spirit f℥xvj; digest 7 days. Antispasmodic, but principally used as a perfume, being too weak for medical use.

TINCTURE OF MYRRH. *Syn.* TINCT. MYRRHÆ, (P. L. E. & D.) *Prep.*—1. (P. L.) Myrrh ℥iij; rectified spirit 1 quart; digest for 14 days, (or percolate, P. E.)—2. (*Wholesale.*) Bruised myrrh 2¼ lbs.; rectified spirit 2 gallons; water 1 gallon. As last. Tonic and stimulant. *Dose.* ½ to 1 dr., as an adjunct in mixtures, &c. Chiefly used, diluted with water, as a dentifrice or wash for ulcerated spongy gums.

TINCTURE OF MYRRH, (COMPOUND.) *Syn.* TINCT. MYRRHÆ COMP. *Prep.* Bruised myrrh and Socotrine aloes, of each 2 lbs.; rectified spirit and water, of each 2½ gallons; digest for 14 days. This is frequently substituted for compound tincture of aloes in the wholesale trade.

TINCTURE OF NUX VOMICA. *Syn.*

TINCT. NUCIS VOMICÆ. *Prep.* (P. D.) Nux vomica (ground in a coffee-mill) ℥ij; rectified spirit f℥viij; macerate 7 (14) days. *Dose.* 5 to 10 drops, in paralysis, &c. It is *poisonous.*

TINCTURE, ODONTALGIC. *Prep.* (Cooler.) Pellitory of Spain ℥ss; camphor ʒiij; opium ʒj; oil of cloves ʒij; rectified spirit f℥xvj; digest for a week. *Used* for the toothache; applied on lint.

TINCTURE OF OPIUM. *Syn.* LAUDANUM. TINCT. OPII, (P. L. E. & D.) *Prep.*—1. (P. L.) Hard opium, powdered, ℥iij; proof spirit 1 quart; macerate 14 days, and filter. This preparation has a deep brownish red color, and mixix contain about 1 gr. of opium. Its sp. gr. is 0·952. (Phillips.) *Dose.* 10 to 60 drops as an anodyne, or hypnotic. The following form is substituted for that of the Pharmacopœia by some wholesale drug houses.—2. Turkey opium 2½ lbs.; boiling water 3 quarts; digest till dissolved, cool, add rectified spirit 2 gallons, and after repose, decant the clear. *Prod.* 4 gallons.

TINCTURE OF OPIUM, (AMMONIATED.) *Syn.* TINCT. OPII AMMONIATA. *Prep.* (P. E.) Benzoic acid and hay saffron, of each, ʒvj; sliced opium ʒiv; oil of aniseed ʒj; spirit of ammonia 1 quart; digest for a week, and filter. Stimulant and antispasmodic *Dose.* 20 to 60 drops in hooping-cough, &c. *** This preparation is called *paregoric,* or *paregoric elixir,* in Scotland, but should be carefully distinguished from the compound tincture of camphor, which passes under the same names in England; as the former contains about 4 times as much opium as the latter.

TINCTURE OF ORANGE PEEL. *Syn* TINCT. AURANTII, (P. L. & E.) T. CORTICIS AURANTII, (P. L. 1788.) *Prep.* (P. L.) Dried orange peel ℥iiiss; proof spirit 1 quart; digest for 14 days. A grateful bitter stomachic. *Dose.* 1 to 3 drs., mostly as an adjunct to mixtures, &c.

TINCTURE OF PELLITORY. *Syn.* TINCT. PYRETHRI. *Prep.* (Pereira.) Pellitory of Spain and water, of each, ℥j; rectified spirit ℥v; digest. *Used* to relieve toothache.

TINCTURE OF QUASSIA. *Syn.* TINCT. QUASSIÆ, (P. E. & D.) *Prep.* (P. E.) Quassia, in chips, ʒx; proof spirit 1 quart; digest 7 days. Bitter. *Dose.* ½ to 2 drs. in dyspepsia and stomach diseases.

TINCTURE OF QUASSIA, (COMP.) *Syn.* TINCT. QUASSIÆ COMP. *Prep.* (P. E.) Cardamoms and cochineal, bruised, of each, ℥ss; powdered cinnamon and quassia chips, of each, ʒvj; raisins ℥vij; proof spirit 1 quart; digest for 7 days, or percolate. Aromatic and tonic. *Dose* and *use* as the last.

TINCTURE OF RHUBARB. *Syn.* TINCT. RHÆI. *Prep.* (P. E.) Powdered rhubarb ℥iiiss; cardamom seeds, bruised, ℥ss; proof spirit 1 quart; digest or percolate. Cordial, stomachic, and laxative. *Dose.* ʒj to ℥j.

TINCTURE OF RHUBARB, (COMP.) *Syn.* TINCT. RHÆI COMP., (P. L. & D.) T. RHABARBARI COMP., (P. L. 1788.) *Prep.*—1. (P. L.) Rhubarb, sliced, ℥iiss; liquorice root, bruised, ʒvj; ginger, bruised, and hay saffron, of each, ʒiij; proof spirit 1 quart; digest 14 days. A popular remedy in diarrhœa and colic, especially of drunkards. *Dose.* As a stomachic, 1 to 3 drs.; as a purgative, ½ to 1½ oz. The tincture of rhubarb of the shops is mostly inferior, being deficient both in rhubarb and spirit. The following forms I have seen extensively used in the wholesale trade:—2. East India rhubarb 20 lbs.; boiling water q. s. to cover it, infuse for 24 hours, then slice the rhubarb, and put it into a cask with moist sugar, 14 lbs.; ginger, bruised, 3½ lbs.; hay saffron 1 lb.; carbonate of potash ½ lb.; bruised nutmegs ½ lb.; rectified spirit 19 gallons; water 21 gallons; macerate with frequent agitation for 14 days, decant the clear, press, and filter the bottoms. Those houses that adhere to the L. Ph. for 1824 substitute cardamom seeds 5 lbs. for the ginger.

TINCTURE OF RHUBARB AND ALOES. *Syn.* TINCT. RHÆI ET ALOES. ELIXIR SACRUM. *Prep.* (P. E.) Rhubarb ℥iss; Socotrine or East Indian aloes ʒvj; cardamom seeds ʒv; proof spirit 1 quart; macerate 7 days, or percolate. A warm stomachic purgative. *Dose.* ½ oz. to 1 oz.

TINCTURE OF RHUBARB AND GENTIAN. *Syn.* TINCT. RHÆI ET GENTIANÆ, (P. E.) T. RHÆI AMARA. *Prep.* (P. E.) Rhubarb ℥ij; gentian ℥ss; proof spirit 1 quart. As last. Stomachic, tonic, and purgative. *Dose.* 1 dr. to 1 oz.

TINCTURE, RUSPINI'S. *Prep.* Orris root ℥viij; cloves ℥j; ambergris ℈j; rectified spirit 1 quart; digest for 14 days. A fashionable dentifrice.

TINCTURE OF SAFFRON. *Syn.* TINCT. CROCI. *Prep.* (P. E.) Hay saffron ℥ij; proof spirit 1 quart; digest or percolate. Stimulant, and emmenagogue. *Dose.* 1 to 2 drs. Chiefly used for its color and flavor.

TINCTURE OF SENNA, (COMPOUND.) *Syn.* TINCT. SENNÆ COMP., (P. L. E. & D.) ELIXIR SALUTIS. *Prep.*—1. (P. L.) Senna ℥iiiss; caraway seeds ʒiiiss; cardamom seeds ʒj; raisins ℥v; proof spirit 1 quart; macerate for 14 days, (or percolate, P. E.)—2. (P. E.) Sugar ℥iiss; coriander seeds ℥j; jalap ʒvj; raisins and senna, of each, ℥iv; caraways and cardamoms, of each, ʒv; proof spirit 1 quart. As last.—3. (*Wholesale.*) Senna 6 lbs.; treacle 2 lbs.; caraways ¾ lb.; cardamoms ¼ lb.; rectified spirit and water, of each, 4 gallons; as before. Carminative, stomachic, and purgative. *Dose.* ¼ to 1 oz.

TINCTURE OF SERPENTARY. *Syn.* TINCT. OF SNAKE ROOT. T. SERPENTARIÆ, (P. L. E. & D.) *Prep.* Serpentary ℥iiiss; proof spirit 1 quart; macerate for 14 days, (or percolate, P. E.) Tonic and diaphoretic. *Dose.* 1 to 3 drs.

TINCTURE OF SQUILLS. *Syn.* TINCT. SCILLÆ, (P. L. E. D.) *Prep.* (P. L.) Dried squills (fresh) ℥v; proof spirit 1 quart; macerate for 14 days, (or percolate, P. E.) Expectorant and diuretic. *Dose.* 10 to 30 drops, in chronic coughs, and other bronchial affections.

TINCTURE OF STRAMONIUM. *Syn.* TINCT. OF THORN APPLE. T. STRAMONII. *Prep.* (P. U. S.) Bruised stramonium seeds ℥ij; proof spirit ℥xvj; digest for 6 days. Anodyne. *Dose.* 10 to 20 drops, in neuralgia, rheumatism, &c. Said to be superior to laudanum.

TINCTURE OF VALERIAN. *Syn.* TINCT. VALERIANÆ, (P. L. E. & D.) *Prep.* (P. L.) Valerian root ℥v; proof spirit 1 quart; macerate 14

days, (or percolate, P. E.) Tonic and antispasmodic. *Dose*. 1 to 3 drs in hysteria, epilepsy, &c.

TINCTURE OF VALERIAN, (COMP.) *Syn*. AMMONIATED TINCTURE OF VALERIAN. VOLATILE DO. DO. TINCT. VALERIANÆ COMP., (P. L.) T. VALERIANÆ AMMONIATA, (P. E. & D.) *Prep*. (P. L.) Valerian ℥v; aromatic spirit of ammonia 1 quart; macerate 14 days, (or percolate P. E.) Stimulant, tonic, and antispasmodic. *Dose* and *use* as the last. The tincture of the shops is generally made with only 1 lb. of the root to the gallon.

TINCTURE OF ACETATE OF ZINC. *Syn*. TINCT. ZINCI ACETATIS. *Prep*. (P. D.) Acetate of potash and sulphate of zinc, of each, ℥j; rub together, then add rectified spirit f℥xvj, and macerate for a week. Astringent. Diluted with water, it is used as a collyrium and injection.

TINCTURES, CONCENTRATED. *Syn*. TINCT. CONCENTRATÆ HAENLI. *Prep*. (Baden Ph.) These are much stronger than ordinary tinctures, and are thus prepared:—Digest 8 parts of the vegetable powder in 16 of spirit of wine 0·857 for 4 days at 72° F., stirring occasionally. Then press and filter. Add to the residue as much spirit as it has absorbed, press, and filter. Mix the liquors, the weight of which should be 16 parts. In this way are prepared concentrated tinctures of aconite leaves; arnica and chamomile flowers; belladonna, conium, digitalis, hyoscyamus, peppermint, and savine leaves; ipecacuanha and valerian roots, &c.

TINCTURES, ÆTHEREAL. *Syn*. TINCT. ÆTHEREÆ. *Prep*. (P. Cod.) 1. ETHEREAL TINCTURE OF ACONITE. Powdered aconite leaves ℥j; sulphuric ether ℥iv, (f℥vj.) It is best prepared by *percolation* in a cylindrical glass vessel furnished with a stopper, and terminating at the lower end in a funnel, which is to be obstructed with a little cotton. The powder being introduced over the cotton, pour on it enough ether to moisten it, put in the stopper, fix the tube into the neck of a bottle, and leave it for 48 hours. Then add gradually the rest of the ether, and, lastly, enough water to displace the ether absorbed. *** In a similar manner are prepared the ethereal tinctures of *arnica flowers*, *belladonna*, *hemlock*, *foxglove*, *tobacco*, *pellitory*, *solanum*, *valerian*, *stramonium*, *&c*., of the Paris Codex.

2. ETHEREAL TINCTURE OF AMBERGRIS. Ambergris ℥j; sulphuric ether ℥iv, (f℥vj;) macerate in a stoppered bottle for 4 days, and filter in a covered funnel. *** In a similar way are made the *ethereal tinctures* of *asafœtida*, *cantharides*, (℥ij to acetic ether ℥viij,) *castor*, *musk*, *amber*, *tolu*, *&c*., of the P. Codex.

3. ETHEREAL TINCTURE OF PERCHLORIDE OF IRON. (*Bestuchef's Tincture*.) Perchloride of iron, (dried,) ʒj; spirit of sulphuric ether fʒix; dissolve.

TINCTURES FOR KITCHEN USE. (See ESSENCES.)

TISANES. *Syn*. PTISANS. Fluid medicines, consisting for the most part of aqueous infusions, or decoctions of substances possessing little activity, and intended to be drunk in considerable quantity. They are much used in France. They may be readily formed by slightly medicating barley, rice, or tamarind water, lemonade, &c. (See JULEPS, DECOCTIONS, INFUSIONS, &c.)

TITANIUM, (after the *Titans* of ancient fable.) A rare metal, discovered by Klaproth, in mechanite, in 1794, but first minutely examined by Wollaston, in 1822. It is hard, brittle, and infusible; sp. gr. 5·3. It is occasionally found at the bottom of the smelting furnaces of iron works, under the form of minute crystals, having a coppery lustre.—OXIDE OF TITANIUM is a deep purple powder, obtained by placing a piece of metallic zinc or iron in the muriatic solution of titanic acid. —TITANIC ACID (*peroxide of titanium*) is found nearly pure in the minerals rutile and anastase. It may be obtained from rutile by fusing it in powder, mixed with 3 times its weight of carbonate of potash, powdering and washing the resulting compound; dissolving in strong muriatic acid; diluting with water, and boiling; when most of the titanic acid falls down, and after being collected on a filter must be well washed with dilute muriatic acid. It may also be prepared by calcining titanium along with nitre, and decomposing the resulting titanate of potassa, as above. Metallic titanium is insoluble in all acids, except the nitro-hydrochloric, and then only when reduced to very fine powder.

TOBACCO. *Syn*. TABAC, (*Fr*.) TABACUM, (*Lat*.) The dried and prepared leaves of the nicotiana tabacum. The name was given by the Spaniards, because it was first seen by them at *Tabasco*, or *Tabaco*, a province of Yucatan, in Mexico. (See SNUFF.) The cheap tobacco vended in the shops is largely adulterated. Tobacco is now offered for sale at 3d. per ounce, *i. e.* 4s. per pound, while the duty alone amounts to about 3s. 3d., thus leaving only 9d. to be divided among the grower, the importer, the manufacturer, and the retailer; besides which there is a loss by weighing it out in small quantities, and by evaporation. Is it possible for this tobacco to be genuine? It cannot be. It is a well-known fact that this tobacco is largely adulterated with foreign matter. It is a general practice to moisten it with treacle water, in which a *little* saltpetre has been dissolved, for the purpose of making it sufficiently adhesive to retain the fine sand which is afterwards added, and to make it burn well. All this is done to increase the weight. When other vegetable matter is mixed with tobacco, "Bengal safflower (at the price of 28s. per cwt.) is preferred. It is infused in a weak solution of potassa or ammonia, the former giving a dark brown color resembling 'Shag,' and the latter a light brown, approaching in appearance to 'Returns.' Considerable loss, however, having occurred from the vegetable matter dissolved out, an improvement has lately been introduced; the safflower, having been moistened, is placed in trays in a cask, into which the ammoniacal gas is allowed to pass. By this process the weight is increased, whereas, after the earlier methods of preparing it, a loss of one half was sustained." (Chem. iii. 304.)

TOBACCO, BRITISH HERB. *Syn*. SPECIES STERNUTORIÆ. *Prep*. Thyme, marjoram, and hyssop, of each 2 oz.; coltsfoot 3 oz.; betony and eyebright, of each 4 oz.; rosemary and lavender, of each 8 oz.; mix, press together, and cut in imitation of manufactured foreign tobacco.

TODDY. From various species of palms, by cutting off the end of the flowering bud, collecting the sap, and letting it stand a few hours to ferment.

TOKAY. A luscious, yet agreeable wine, made in Hungary. It is preferred in the *turbid* state, and hence it is agitated before pouring it into the glass.

TOMBAC, (WHITE.) *Syn.* White Copper. An alloy of copper and arsenic. (See German Silver.)

TONICS. (From τονος, *I strengthen.*) Medicines that increase the tone of the muscular fibre, and impart vigor to the system. The principal *mineral tonics* are—iron, zinc, copper, silver, arsenic, bismuth, mercury, and the mineral acids. The principal *vegetable tonics* are—cinchona, cinchonine, quinine, the vegetable bitters, and some of the aromatics. Of the above, *iron, bark*, and its preparations, and the *aromatic bitters*, are those generally employed, and which prove most genial to the constitution.

TONQUIN REMEDY. *Syn.* Pulvis Tunchinensis. P. Alexipharmicus Sinensis. *Prep.* Powdered valerian 20 grs.; musk 16 grs.; camphor 6 grs.; mix. Antispasmodic, alexiterial, in doses of 6 to 12 grs. in hooping-cough; to 1 dr. in hydrophobia and exanthemata; to ℈iss in mania.

TOOTHACHE. This frequently arises from sympathy with a *disordered stomach.* In such cases administer a saline purgative, and an emetic if required. When *cold* is the cause, the best remedy is a hot embrocation of poppy-heads, followed by the use of flannel. When it arises from a *hollow* or *decayed tooth*, the best application is a piece of lint moistened with creosote, or a strong spirituous solution of creosote, and closely rammed into the cavity of the tooth. Laudanum and tincture of pellitory of Spain are also used in the same way. To prevent the recurrence of the latter kind of toothache, the cavity should be filled with an amalgam of gold, or with mineral marmoratum.

TRACING PAPER. In order to prepare a beautiful, transparent, colorless paper, it is best to employ the varnish formed with Damara resin in the following way:—The sheets intended for this purpose are laid flat on each other, and the varnish spread over the uppermost sheet by means of a brush, until the paper appears perfectly colorless, without, however, the liquid therein being visible. The first sheet is then removed, hung up for drying, and the second treated in the same way. After being dried, this paper is capable of being written on, either with chalk and pencil, or steel pens. It preserves its colorless transparency without becoming yellow, as is frequently the case with that prepared in any other way; it is at the same time cheap, and the operation gives very little trouble. (Verh. d. Gew. V. ru. Köln.) See Paper.

TRAGACANTHIN. *Syn.* Adragantin. The soluble gum of tragacanth. It slightly differs from arabine.

TREACLE, GERMAN. *Syn.* Extract of Juniper Berries. *Prep.*—1. (*Best.*) An evaporated cold infusion of juniper berries.—2. (*Common.*) An evaporated decoction of juniper berries. Both are sweet-tasted, aromatic, and diuretic.

TREACLE, VENICE. *Syn.* Theriaca. Theriaca Andromachi (P. L. 1746) consists of 61 ingredients, and contains 1 grain of opium in 75. The theriaca of P. Cod. consists of 72 ingredients, and contains gr. j of opium in 72.. For these the following may be substituted: *Theriaca edinensis*, (P. E. 1744.) Serpentary root ℥vj; valerian and contrayerva roots, of each ℥iv; aromatic powder ℥iij; guaiacum, resin, castor, and nutmeg, of each ℥ij; saffron and opium, (dissolved in a little wine,) each ℥j; clarified honey ℥lxxv; reduce all the dry ingredients to fine powder, then mix. 100 grs. contain 1 gr. of opium.

TUNGSTEN. (From *tung sten*, Swed., *heavy stone*, from the density of its ores.) *Syn.* Woolfram. Woolframium. Scheelium. Tungstenum. A heavy, gray, brittle metal, discovered by Messrs. Delhuyart. Its sp. gr. is 17·35. It occurs in the mineral woolfram, united with oxygen, (*tungstic acid*,) manganese, and iron, from which it may be obtained by the action of charcoal or hydrogen gas, assisted by heat. It is, however, more conveniently obtained by treating tungstic acid as above. *Tungstic acid* is a yellow powder, obtained by digesting native tungstate of lime, finely powdered, in nitric acid. It is insoluble in water, but soluble in a concentrated solution of pure potassa, forming *tungstate of potassa.*

TURMERIC. The root of the curcuma longa and rotunda, a plant which grows in the East Indies. Its coloring principle is called *curcumine.* Turmeric is employed to give a fugitive golden yellow with weld, and an orange tinge to scarlet. It dyes wool and silk, mordanted with common salt or sal ammoniac, a fugitive yellow.

TURPENTINE, CHIO, (FACTITIOUS.) *Syn.* Terebinthina Chia Factitia. *Prep.* Black rosin 7 lbs.; melt, remove the heat, and stir in balsam of Canada 7 lbs. Some add a few drops of the oils of fennel and juniper. This article is now very generally sold in trade for genuine Chia turpentine.

TURPENTINE, VENICE. *Syn.* Terebinthina Veneta. Genuine Venice turpentine is the product of the Larix Europæa, but this is now scarcely ever met with in trade. That of the shops is wholly a factitious article, made as follows:—Black rosin 48 lbs.; melt, remove the heat, and add oil of turpentine 2 gallons.

TUTTY. *Syn.* Tutia. Tuthia. Impure Oxide of Zinc. The sublimate that collects in the chimneys of the furnaces in which ores of zinc are smelted. Drying; astringent. *Used* in eye-waters and ointments.

TYPE METAL. *Prep.* Lead 3 parts; antimony 1 part; melted together. Small types are usually made of a harder composition than large ones. A good *stereotype metal* is said to be made of lead 9 parts; antimony 2 do.; bismuth 1 do. This alloy expands as it cools, and consequently brings out a fine impression.

ULMIN. *Syn.* Ulmic Acid. This name has been given to a peculiar substance examined by Klaproth in 1802, and which was a spontaneous exudation from the trunk of a species of elm, (Ulmus nigra.) It has since been observed on many

other trees. When dry, it is hard, blackish, resinous, readily soluble in the mouth, but insoluble in alcohol and ether. It may be formed artificially by heating caustic potassa with wood, by the action of sulphuric acid on vegetable matter, and by combining gallic acid with ammonia and exposing the compound to oxygen.

ULTRAMARINE. *Syn.* ULTRAMARINE BLUE. CŒRULEUM ULTRAMONTANUM, (*Lat.*) OUTREMER, (*Fr.*) ULTRAMARINS, (*Ger.*) This beautiful pigment is obtained from the blue mineral lazulite or lapis lazuli; the finest specimens of which are brought from China, Persia, and Great Bucharia. *Prep.* Lapis lazuli (reduced to fragments about the size of a pea, and the colorless pieces rejected) lb. j, is heated to redness, quenched in water, and ground to an impalpable powder; to this is added, yellow rosin 6 oz.; turpentine, beeswax, linseed oil, of each 2 oz.; previously melted together, and the whole made into a mass; this is kneaded in successive portions of warm water, which it colors blue, and from whence it is deposited by standing, collected, well washed with clean water, dried, and sorted according to its qualities. Some persons prefer leaving the pieces of wax for 14 or 15 days in the water before kneading them; the first water, which is usually dirty, is thrown away; the second gives a blue of the first quality; and the third yields one of less value. The process is founded on the property which the coloring matter of azure-stone has of adhering less firmly to the resinous cement than the foreign matter with which it is associated. When azure-stone has its color altered by a moderate heat, it is reckoned bad. The price of ultramarine of the richest shade of blue is 4 to 5 guineas per oz. Genuine ultramarine, as well as lazulite, when heated to a full red, does not change color. Ultramarine is the most splendid and permanent blue pigment the painter possesses, and works well in oil.

ULTRAMARINE ASHES. *Syn.* SAUNDER'S BLUE. Obtained from the resinous mass of the last process after it has yielded all its ultramarine, by melting it with fresh oil, and kneading it in water containing a little potash or soda; or by burning away the wax and oil of the mass, and well grinding and washing the residue with water. Inferior to ultramarine.

ULTRAMARINE, FACTITIOUS. According to Gmelin, of Tübingen, sulphuret of sodium is the coloring principle of lapis lazuli, to which the color of ultramarine is owing; but, according to Elsner and Tirmmon, a minute quantity of sulphuret of iron is an essential ingredient. The above, and several other chemists, have succeeded in preparing artificial ultramarine, by heating sulphuret of sodium with a mixture of silicic acid and alumina. In these cases it is said that a minute quantity of iron is derived from the alum, (Tirmmon;) but it appears doubtful whether the color can depend on the presence of so small a portion of that metal. The finer specimens of artificial ultramarine are quite equal in durability and beauty of color to that prepared from lazulite, while it is much less expensive. In Paris it fetches 60 francs, or about 2 guineas a pound.

Prep. I. (Tirmmon.) Crystallized carbonate of soda 1075 grs.; apply a gentle heat, and when fused in its water of crystallization, shake in finely-pulverized orpiment 5 grs., and when partly decomposed, add as much gelatinous hydrate of alumina as contains 7 grs. of anhydrous alumina; finely-sifted clay 100 grs., and flowers of sulphur 221 grs., are then to be added, and the whole placed in a covered crucible, and at first gently heated to drive off the water; and as soon as this is effected, raised to redness. The heat must be so regulated that the mass only "sinters" together without fusing. The mass must be then cooled, finely pulverized, suspended in river water, and brought upon a filter. The product has now a beautiful delicate green or bluish color. It must next be heated in a covered dish, and stirred about from time to time, till the temperature reaches that of *dull* redness, at which it must be kept for 1 or 2 hours. If the heat of the first calcination has been properly regulated, the whole of the mass taken from the crucible will have a uniform color; but if too little heat has been used, and the ingredients have not been properly mixed, there will be colorless parts, which should be rejected; if too much heat has been used, or the mass allowed to *fuse*, brown parts will appear, especially if the crucible is of a bad kind, or easily destroyed. (Compt. Rend., Mai 1842, p. 761.)

II. (Gmelin.) Sulphur 2 parts; dry carbonate of soda 1 part; mix well, gradually heat them in a covered crucible to redness till the mixture fuses, then sprinkle in by degrees another mixture of silicate of soda and aluminate of soda, (containing 72 parts of silica, and 70 parts of alumina,) and continue the heat for 1 hour longer. The product contains a little free sulphur, which may be separated by water.

III. (M. Robiquet.) By heating to redness a mixture of pure kaolin, sulphur, and carbonate of soda.

IV. Artificial ultramarine is occasionally formed in preparing *Antim. diaphor. ablutum*, and frequently also in the preparation of milk of sulphur. When chlorated water is added to a solution of sulphuret of potassium made with common potash and sulphur of commerce, green or blue flakes are thrown down. The earthen vessels in which the melting process has been effected, no doubt afford the alumina, silica, and iron. (Jahr. für Prakt. Pharm., iv. p. 83.)

URAMILE. A product of the decomposition of thionuric acid, discovered by Wöhler and Liebig. It is obtained by treating a hot saturated solution of thionurate of ammonia, with hydrochloric acid in excess, and boiling till a slight turbidity is observed, when the whole is converted into a semi-fluid mass. Crystalline or pulverulent. Soluble in boiling water and alkalis.

URAMILIC ACID. A product of the decomposition of uramile, discovered by Wöhler and Liebig. A saturated solution of thionurate of ammonia in cold water, is mixed with a small quantity of sulphuric acid, and the mixture evaporated in a water-bath, when crystals of uramilic acid are slowly deposited. Soluble in water; with the alkalis it forms crystallizable salts, called *uramilates*.

URANIUM. *Syn.* URANITE. A metal discovered by Klaproth in 1789, and named after the planet Uranus, which was discovered about the same time. It occurs in the *pechblende* of Saxony, and the *uranite* of Cornwall. Uranium may be

extracted from the former mineral by heating it to redness, cooling, powdering, digesting it in nitric acid diluted with 3 or 4 parts of water, in quantity insufficient to dissolve the whole, passing sulphureted hydrogen through the solution, boiling to expel free sulphurous gas, concentrating by evaporation, and setting the remaining fluid aside to crystallize, when beautiful lemon-colored crystals of *pernitrate of uranium* are slowly deposited. These crystals, exposed to a strong heat, yield *protoxide of uranium*, (green oxide,) which, by exposure to hydrogen gas and heat, are reduced, and metallic uranium remains. (Arfwedson.) It is a brittle, gray, or reddish-brown metal; sp. gr. about 9·0.—*Peroxide of uranium* (yellow oxide, uranic acid) is precipitated as a yellow hydrate, when a pure alkali is added to a solution of the pernitrate, and as a carbonate when alkaline carbonates are used. It is soluble in alkalis in excess, acting the part of a feeble acid. The salts of *protoxide* of uranium are characterized by their green color; those of the peroxide by a yellow color. With prussiate of potash they yield a *reddish-brown* precipitate, resembling prussiate of copper, and with infusion of galls a *brown* one. Sulphureted hydrogen turns the solutions of the persalts *green*.

UREA. *Syn.* Cyanate of Ammonia, (Anomalous.) A crystalline, colorless, transparent substance, discovered by Fourcroy and Vauquelin in urine, and by Wöhler as the first organic compound artificially produced.

Prep. I. (Thénard.) Fresh urine, gently evaporated to the consistence of a sirup, is to be treated with its own volume of nitric acid at 24 deg.; the mixture is to be shaken and immersed in an ice-bath to solidify the crystals of supernitrate of urea; these are washed with water at 0, drained, and pressed between sheets of blotting paper. When they are thus separated from foreign matters, they are to be dissolved in water, to which subcarbonate of potash is added, whereby the nitric acid is taken up, and the urea set at liberty. This new liquor is evaporated at a gentle heat, nearly to dryness; the residue is treated with pure alcohol, which only dissolves the urea, the solution is concentrated, and the urea crystallizes.

II. (Liebig.) See Cyanate of Ammonia, p. 57.

⁎ Urea has the sp. gr. 1·33, is freely soluble in water and alcohol, fuses at 250°, and is decomposed at higher temperatures. It is said to be diuretic, and has been given in the dose of a gros, dissolved in sugared water.

URIC ACID. *Syn.* Lithic Acid. An acid discovered by Scheele, and peculiar to the urine of certain animals, and the excrement of serpents and several birds of prey. The fæces of the boa constrictor consist of little else than *urate of ammonia*. Uric acid forms one of the commonest varieties of urinary calculi, and of the red gravel or sand, which is voided in certain morbid states of the urine. *Guano*, which is largely imported for manure, is also composed in greater part of urate of ammonia; hence its immense powers as a fertilizer of the soil.

Prep. Dissolve urinary calculi, or the chalk-like excrement of serpents, reduced to fine powder, in a solution of caustic potassa, by boiling, add muriatic acid in excess, again boil for 15 minutes, and well mix the precipitate with water

Prop., Tests, &c. Brilliant small scales, white and silky, tasteless, inodorous, slightly soluble in boiling water, soluble in strong sulphuric acid, and again precipitated by water, it forms salts with the bases called *urates*. The characteristic of uric acid is, that, when moistened with nitric acid and heated, it dissolves, and by evaporation yields a red compound, which, upon the addition of a drop or two of solution of caustic ammonia, becomes of a fine crimson, (*purpurate of ammonia*.)

URIC OXIDE. *Syn.* Xanthic Oxide. A rare constituent of urinary calculi, discovered by Marcet.

USQUEBAUGH. *Syn.* Escubac. A strong compound liquor, much drunk in Ireland, and made in the greatest perfection at Drogheda.

Prep. I. (*Yellow.*) *a.* Brandy or proof spirit 3 gallons; hay saffron and juniper berries, of each 1 oz.; dates, without their kernels, and raisins, of each, bruised, ¼ lb.; mace, cloves, coriander, and aniseed, of each ½ oz.; cinnamon ¼ oz.; digest till sufficiently flavored and colored; filter, and add capillaire, or simple sirup, 1 gallon.—*b.* Proof spirit 1 gallon; stoned raisins 1 lb.; cinnamon, cloves, and nutmegs, of each ½ oz.; aniseed 1 oz.; hay saffron ½ oz.; brown sugar 2 lbs.; rind of 1 orange; digest 14 days, then filter or clarify.—*c.* Pimento and caraways, of each 3 oz.; mace, cloves, and nutmegs, of each 2 oz.; aniseed, coriander, and angelica root, of each 8 oz.; hay saffron 3 oz.; raisins, stoned and bruised, 14 lbs.; proof spirit 9 gallons; digest 14 days, with frequent agitation, then press, filter, or clarify, and add simple sirup q. s. Should it turn milky, add a little strong spirit, or clarify it with alum, or filter through magnesia.

II. (*Green.*) As the above, but using sap green to color, instead of saffron.

VACCINE MATTER. Collected either upon lancets, or by opening the pustule, and applying a small glass ball and tube (like those called by the boys in London candle pops, or fire pops) to the opening, expelling part of the air in the ball by bringing a lighted taper near it, then withdrawing the taper, the matter is drawn into the ball, in which it may be sealed up hermetically or cemented, and thus kept for a length of time. It is also commonly preserved between two small pieces of glass. *Used* lately for an absolute preventive of the smallpox, but now with a view of diminishing the susceptibility of acquiring that disease, and to render it milder if acquired. The matter may be liquefied with a little clean water. Smallpox matter is collected in the same way. *Used* occasionally to communicate the disease, under favorable circumstances, instead of hazarding it being acquired under unfavorable ones. Both of these matters are applied in the way described under Inoculation.

VALERIANIC ACID. A volatile, fatty acid, obtained by distilling valerian root along with water, and acting on the product with caustic potassa, when valerianate of potassa is formed, and a volatile oil is separated; by evaporating to dryness, the latter is dissipated, and the dry mixture, treated with dilute sulphuric acid and distilled, yields an aqueous solution of valerianic acid. By careful redistillation it may be deprived of water. Vale-

rianic acid may also be produced artificially, by heating fused potassa along with the oil of potato, or corn spirit, (*hydrated oxide of amule,*) when valerianate of potassa is obtained, the acid of which is identical in all respects with that obtained from the root of *Valeriana Officinalis.* (Liebig.) *** Colorless, limpid, oleaginous; boils at 270°; soluble in alcohol and ether, and in 30 parts of water; smells strongly of valerian; with the bases it forms salts called *Valerianates*, most of which are soluble.

VANADIUM. (From *Vanadis*, a Scandinavian idol.) A rare metal discovered by Sefstöm, in 1830, in some Swedish iron, extracted from an iron mine near Jönköping. It has since been found in a lead ore from Scotland. It is white, brittle, very difficult of reduction, and soluble in nitric and nitromuriatic acids, with which it yields dark blue colored solutions. *Vanadium* is obtained from the native vanadate of lead, by dissolving the ore in nitric acid, passing sulphureted hydrogen through the solution, to throw down lead and arsenic, and evaporating the resulting blue liquid to dryness; the residuum is then dissolved in a solution of ammonia, and a piece of sal ammoniac, considerably larger than can be dissolved, introduced; as the latter dissolves, a pulverulent precipitate of *vanadate of ammonia* is formed, which must be washed, first in a solution of sal ammoniac, and then in alcohol of 0·860. By exposing this salt, in an open platinum crucible, to a heat a little below redness, and keeping it constantly stirred, until it acquires a dark red color, *pure vanadic acid* is obtained. (Johnston.) From this acid *metallic vanadium* may be procured, by placing fused fragments of it, and potassium, of equal size, in alternate layers, in a porcelain crucible, the potassium being in the largest proportion, and after well luting on the cover, heating it *carefully* over a spirit-lamp; the cooled mass must then be washed with water. (Berzelius.)—*Protoxide of vanadium* is obtained by acting on vanadic acid by heat and charcoal, or hydrogen gas. Black.—*Binoxide of vanadium*, by heating to dull redness a mixture of 10 parts of the protoxide and 12 of vanadic acid, in an atmosphere of carbonic acid gas, or out of contact with air and combustible matter. It is also formed by heating vanadate of ammonia in close vessels. A black powder. It is precipitated as a grayish-white hydrate from its solutions, by carbonate of soda in slight excess.—*Vanadic acid* (peroxide) is orange-colored, scarcely soluble in water, and forms, with the alkaline bases, soluble salts, called *Vanadates*, and with the other bases, sparingly soluble salts. All of these have an orange or yellow color. Vanadium is distinguished from chromium by deoxidizing substances giving a *blue* color to solutions of the former, but a *green* one to solutions of the latter.—"Vanadate of ammonia, mixed with solution of galls, forms a black fluid, which is the best writing ink hitherto known. The quantity of the salt required for this purpose is very small; the writing is perfectly black, and not obliterated by alkalis, acids, chlorine, or other reagents, that at the same time will not destroy the paper." (Ure.)

VAN SWIETEN'S DROPS. A solution of corrosive sublimate. (See Solution of Bichloride of Mercury, P. L.)

VARNISH. *Syn.* Vernis, (*Fr.*) Firniss (*Ger.*) A solution of resinous matter, which, when spread thin upon the surface of a solid body, becomes dry, and forms a glossy, transparent coating, impervious to air and moisture. Varnishes may be conveniently divided into two kinds, viz., *spirit and oil varnishes.* Concentrated alcohol is used as the solvent in the former, and fixed or volatile oils, or mixtures of the two, for the latter. The sp. gr. of alcohol for the purpose of making varnishes should not be greater than 0·820. Camphor is often dissolved in it to increase its solvent power. The oil of turpentine, which is the essential oil chiefly employed, should be pure and colorless. Pale drying linseed oil is the fixed oil generally used for varnishes, but poppy and nut oil are also occasionally employed. Among the substances which are dissolved in the above menstrua are,—*turpentine, copal, mastich, lac, elemi, sandarach, anime,* and *amber*, to impart body and lustre; *benzoin* to impart scent; *gamboge, turmeric, saffron, annotto,* and *Socotrine aloes*, to give a yellow color; *dragon's blood* to give a red tinge; *asphaltum* to give a black color and body; *caoutchouc* to impart body, toughness, and elasticity.

In the preparation of Spirit Varnishes, care should be taken to prevent the evaporation of the alcohol as much as possible, and also to preserve the portion that evaporates. On the large scale, a common still, mounted with its head and connected with a proper refrigerator, should be employed. The capital should be furnished with a stuffing-box, to permit of the passage of a vertical rod, connected with a stirrer at one end, and a working handle at the other. The gum and spirit being introduced, and the head of the still closely fitted on and luted, heat (preferably that of steam or a water-bath) should be applied, and the spirit brought to a boil, when the heat should be partially withdrawn, and agitation continued till the gum is dissolved. The spirit which has distilled over should be then added to the varnish, and, after thorough admixture, the whole should be run off through a silk gauze sieve into stone jars, which should be immediately corked down, and set aside to clarify. On the small scale, spirit varnishes are best made by maceration in close bottles. In order to prevent the agglutination of the resin, it is often advantageously mixed with clear silicious sand, or pounded glass, by which the surface is much increased, and the solvent power of the menstruum promoted.

In the manufacture of oil varnishes, one of the most important points is the use of good drying oil. Linseed oil for this purpose should be pale, limpid, brilliant, scarcely odorous, and mellow and sweet to the taste.—100 gallons of such oil are put into an iron or copper boiler, capable of holding 150 gallons, and gradually heated to a gentle simmer for 2 hours, to expel moisture; the scum is then carefully removed, and 14 lbs. of scale litharge, 12 lbs. of red lead, and 8 lbs. of powdered umber, (all carefully dried and free from moisture,) are gradually sprinkled in; the whole is then kept well stirred, to prevent the driers sinking to the bottom, and the boiling is continued, at a gentle heat, for 3 hours longer; the fire is next withdrawn, and, in 24 to 36 hours, the scum is carefully removed, and the clear supernatant oil decanted from the bottom. This forms the best *boiled* or *drying oil*. *Another* method is to heat a hogshead of the oil

gradually for 2 hours, then to gently simmer it for about 3 hours longer, and, after removing the scum, to add *gradually* 1 lb. of the best calcined magnesia, observing to mix it up well with the oil, and afterwards to continue the boiling pretty briskly for 1 hour, employing constant agitation. The fire is then allowed to die away, and, after 24 hours, the oil is decanted as before. The product is called "*clarified oil*," and requires to be used with driers. It should be allowed to lie in the cistern for 2 or 3 months to clarify. In the preparation of oil varnishes, the "gum" is melted as rapidly as possible, without discoloring or burning it; and when completely fused, the oil, also heated to *nearly* the boiling point, is poured in, after which the mixture is boiled till it appears perfectly homogeneous and clear like oil, when the heat is raised, and the driers (if any are to be used) gradually and cautiously scattered in, and the boiling continued, with constant stirring, for 3 or 4 hours, or till a little when cooled on a palette knife, feels strong and stringy between the fingers. The whole is next allowed to cool considerably; but while still *quite fluid*, the turpentine, previously made *moderately* hot, is cautiously added, and the whole thoroughly incorporated. The varnish is then run through a filter or sieve into stone jars, cans, or other vessels, and set aside to clarify by subsidence. When no driers are used, the mixture of oil and gum is boiled till it runs perfectly clear, when it is removed from the fire, and, after it has cooled a little, the turpentine is added as above. It is generally conceived that the more perfectly the "*gum*" is fused, or "*run*," as it is called, the greater and stronger will be the product; and the longer the boiling of the "gum" and oil is continued, within moderation, the freer the varnish will work and cover when made. An excess of heat renders the varnish "stringy," and injures its flowing qualities. For *pale varnishes* as little heat as possible should be employed throughout the whole process. *Body varnishes* should contain 1½ lbs.; *carriage, wainscot*, and *mahogany* varnish 1 lb.; and *gold size*, and *black japan*, fully ½ lb. of "gum" per gallon, besides the asphaltum in the latter. The use of too much driers injures the brilliancy and transparency of the varnish. Copperas does not combine with varnish, but only hardens it; sugar of lead does. I am informed that boiling oil of turpentine combines very readily with melted copal, and that it is an improvement to use it, either before or in conjunction with the oil, in the preparation of copal varnish that is desired very white. All varnishes require age before use. Trans. of the Soc. of Arts, vol. 49; and COPAL, AMBER, CAOUTCHOUC.

*** From the inflammable nature of the materials of which varnishes are composed, their manufacture should be only carried on in a detached building, that is of little value, and built of uninflammable materials. When a pot of varnish, gum, or turpentine, catches fire, it is most readily extinguished by closely covering it with a piece of stout woollen carpeting, which should be always kept ready for the purpose.

††† To give lustre to varnish after it is laid on, it is rubbed with pumice-stone very finely powdered, and water; which being dried with a cloth, the work is afterward patiently rubbed with an oiled rag and tripoli, till the required polish is produced. The surface is last of all cleaned with soft linen cloths, cleared of all greasiness with powder of starch, and rubbed bright with the palm of the hand.

¶¶¶ In *varnishing*, care must be taken that the surface is free from *grease*, or *smoke;* as unless this is the case, the best oil or turpentine varnish in the world will not dry and harden. Old articles are usually washed with soap and water, by the painters, before being varnished.

VARNISH, AMBER. *Prep.* I. (*Pale.*) Amber, pale and transparent, 6 lbs.; fuse, add hot clarified linseed oil 2 gallons; boil till it strings strongly, cool a little, and add oil of turpentine 4 gallons. Pale as copal varnish; soon becomes very hard, and is the most durable of oil varnishes; but requires time before it is fit for polishing. When wanted to dry and harden quicker, "drying" oil may be substituted for linseed, or "driers" may be added during the boiling.

II. Amber 1 lb.; melt, add Scio turpentine ½ lb.; transparent white resin 2 oz.; hot linseed oil 1 pint; and afterwards oil of turpentine q. s.; as above. Very tough.

III. (*Hard.*) Melted amber 4 oz.; hot boiled oil 1 quart; as before.

IV. (*Pale.*) Very pale and transparent amber 4 oz.; clarified linseed oil and oil of turpentine, of each 1 pint; as before.

*** Amber varnish is suited for all purposes, where a very hard and durable oil varnish is required. The paler kind is superior to copal varnish, and is often mixed with the latter to increase its hardness and durability. (See AMBER.)

VARNISH, BLACK. *Prep.* I. (*Black amber varnish.*) Amber 1 lb.; fuse, add hot *drying* oil ½ pint; powdered black rosin, and asphaltum, (*Naples*,) of each 3 oz.; when properly incorporated and considerably cooled, add oil of turpentine 1 pint. This is the beautiful black varnish of the coachmakers. It is also fit for metals.

II. (*Ironwork black.*) Asphaltum 48 lbs.; fuse, add boiled oil 10 gallons; red lead and litharge, of each 7 lbs.; dried and powdered white copperas 3 lbs.; boil for 2 hours, then add dark gum amber (fused) 8 lbs.; hot linseed oil 2 gallons; boil for 2 hours longer, or till a little of the mass, when cooled, may be rolled into pills, then withdraw the heat, and afterwards thin down with oil of turpentine 30 gallons. *Used* for the ironwork of carriages, and other nice purposes.

III. (*Black japan.*) Naples asphaltum 50 lbs.; dark gum anime 8 lbs.; fuse, add linseed oil 12 gallons; boil, add dark gum amber 10 lbs.; previously fused and boiled with linseed oil 2 gallons; add the driers, and proceed as last. *Used* for wood or metals.

IV. (*Brunswick black.*)—*a.* Foreign asphaltum 45 lbs.; drying oil 6 galls.; litharge 6 lbs.; boil as last, and thin with 25 gallons of oil of turpentine. *Used* for ironwork, &c.—*b.* Black pitch and gas tar asphaltum, of each 25 lbs.; boil gently for 5 hours, then add linseed oil 8 gallons; litharge and red lead, of each 10 lbs.; boil as before, and thin with oil of turpentine 20 gallons. Inferior to the last, but cheaper. (See AMBER VARNISH.)

VARNISH, BODY. *Prep.* I. Finest African copal 8 lbs.; fuse carefully, add clarified oil 2 gal-

lons; boil gently for 4½ hours, or till quite stringy, cool a little and thin with oil of turpentine 3½ gallons. *Dries slowly.*

II. Pale gum copal 8 lbs.; clarified oil 2 gallons; dried sugar of lead ½ lb.; boil as before, then add oil of turpentine 3½ gallons, and mix it, while still hot, with the following varnish:—8 lbs. of pale gum anime; linseed oil 2 gallons; dried white copperas ¼ lb.; boil as before, and thin with oil of turpentine 3½ gallons; the mixed varnishes are to be immediately strained into the cans or cistern. *Dries* in about 6 hours in winter, and 4 hours in summer. *Used* for the bodies of coaches and other vehicles.

VARNISH, CABINET-MAKERS'. *Prep.* I. Very pale shellac 5 lbs.; mastich 7 oz.; alcohol, of 90§, 5 or 6 pints; dissolve in the cold with frequent stirring. *Used* for French polishing, &c. It is always opaque. A similar varnish, made with weaker spirit, is used by bookbinders to varnish morocco leather book covers.

II. As the last, but substitute wood naphtha 6 pints for the alcohol.

III. (*Japanner's copal varnish.*) Pale African copal 7 lbs; fuse, add clarified linseed oil ½ gallon; boil for 5 minutes, remove it into the open air, add boiling oil of turpentine 3 gallons, mix well, strain it into the cistern, and cover it up immediately. *Used* to varnish furniture, and by japanners, coachmakers, &c. *Dries* in 15 minutes, and may be polished as soon as hard. (See French Polish.)

VARNISH, CARRIAGE. I. (*Spirit.*) Sandarach 19 oz.; pale shellac 9½ oz.; very pale transparent rosin, 12½ oz.; turpentine 18 oz.; alcohol, at 85§, 5 pints; dissolve. *Used* for the internal parts of carriages, &c. *Dries* in 10 minutes or less.

II. (*Best Pale.*) Pale African copal 8 lbs.; fuse, add clarified linseed oil 2½ gallons; boil till very stringy, then add dried copperas and litharge, of each ¼ lb.; boil as before directed, thin with oil of turpentine 5½ gallons, mix while hot with the following varnish, and immediately strain the mixture into a covered vessel:—Gum anime 8 lbs.; clarified linseed oil 2½ gallons; dried sugar of lead and litharge, of each ¼ lb.; boil as before, thin with oil of turpentine 5½ gallons, and mix it while hot with the last varnish as above directed. *Dries* in 4 hours in summer and 6 in winter. *Used* for the wheels, springs, and carriage parts of coaches, and other vehicles, and by house painters, decorators, &c., who want a strong, quick-drying, and durable varnish.

III. (*Second Quality.*) Sorted gum anime 8 lbs.; clarified oil 3 gallons; litharge 5 oz.; dried and powdered sugar of lead and white copperas, of each 4 oz.; boil as last and thin with oil of turpentine 5½ gallons.

VARNISH, COPAL. *Prep.*—1. (*Turpentine.*) Oil of turpentine 1 pint; set the bottle in a water bath, and add in small portions at a time, 3 oz. of powdered copal that has been previously melted by a gentle heat, and dropped into water; in a few days decant the clear. *Dries* slowly, but is very pale and durable. *Used* for pictures, &c.

II. (*Oil.*) Pale hard copal 2 lbs.; fuse, add hot drying oil 1 pint; boil as before directed, and thin with oil of turpentine 3 pints, or q. s. Very pale. *Dries* hard in 12 to 24 hours.

III. Clearest and palest African copal 8 lbs.; fuse, add hot and pale drying oil 2 gallons; boil till it strings strongly, cool a little, and thin with hot rectified oil of turpentine 3 gallons, and immediately strain into the store can. Very fine. Both the above are *used* for pictures.

IV. (*Spirit.*) Coarsely-powdered copal and glass, of each 4 oz.; alcohol, of 90§, 1 pint; camphor ½ oz.; heat it in a water-bath so that the bubbles may be counted as they rise, observing frequently to stir the mixture; when cold decant the clear. *Used* for pictures.

V. Copal melted and dropped into water 3 oz.; gum sandarach 6 oz.; mastich and Chio turpentine, of each 2½ oz.; powdered glass 4 oz.; alcohol, of 85§, 1 quart; dissolve by a gentle heat. *Used* for metal chairs, &c.

*** All copal varnishes are hard and durable, though less so than those made of amber, but they have the advantage over the latter of being paler. They are applied on coaches, pictures, polished metal, wood, and other objects requiring good durable varnish. (See Body and Carriage Varnishes, and Copal.)

VARNISH, CRYSTAL. *Prep.* I. Genuine pale Canada balsam and rectified oil of turpentine, equal parts; mix, place the bottle in warm water, agitate well, set it aside, in a moderately warm place, and in a week pour off the clear. *Used* for maps, prints, drawings, and other articles of paper, and also to prepare tracing paper, and to transfer engravings.

II. Mastich 3 oz.; alcohol 1 pint; dissolve. *Used* to fix pencil drawings.

VARNISH, ETCHING. *Prep.* I. (Lawrence.) White wax 2 oz.; black and Burgundy pitch, of each ½ oz.; melt together, add by degrees powdered asphaltum 2 oz., and boil till a drop taken out on a plate will break when cold by being bent double 2 or 3 times between the fingers; it must then be poured into warm water and made into small balls for use.

II. (*Callot's Hard Varnish. Florentine do.*) Linseed oil and mastich, of each 4 oz.; melt together.

III. (*Callot's Soft Varnish.*) Linseed oil 4 oz.; gum benzoin and white wax, of each ½ oz.; boil to two-thirds.

VARNISH, FURNITURE. *Prep.* White wax 6 oz.; oil of turpentine 1 pint; dissolve by a gentle heat. *Used* to polish wood by friction. (See Cabinet-makers' and Copal Varnishes.)

VARNISH, FLEXIBLE. *Prep.*—1. Indian rubber in shavings 1 oz.; mineral naphtha 2 lbs.; digest at a gentle heat in a close vessel till dissolved, and strain.—2. Indian rubber 1 oz.; drying oil 1 quart; dissolve by as little heat as possible, employing constant stirring, then strain. 3. Linseed oil 1 gallon; dried white copperas and sugar of lead, of each 3 oz.; litharge 8 oz.; boil with constant agitation till it strings well, then cool slowly and decant the clear. If too thick, thin it with quick-drying linseed oil. The above are used for balloons, gas bags, &c. (See Balloon Varnish and Caoutchouc.)

VARNISH FOR GILDED ARTICLES. *Prep.* (Watin.) Gum lac in grains, gamboge, dragon's blood, and annotto, of each 12½ oz.; saffron 3½ oz.; each resin must be dissolved separate-

y in 5 pints of alcohol of 90%, and two separate tinctures must be made with the dragon's blood and annotto in a like quantity of spirit, and a proper proportion of each mixed together to produce the required shade.

VARNISH, ITALIAN. *Prep.*—1. Boil Scio turpentine till brittle, powder, and dissolve in oil of turpentine.—2. Canada balsam and clear white rosin, of each 6 oz.; oil of turpentine 1 quart; dissolve. *Used* for prints, &c.

VARNISH, LAC. *Prep.*—1. Seed lac 8 oz.; alcohol 1 quart; digest in a close vessel in a warm situation for 3 or 4 days, then decant and strain.—2. Substitute lac bleached by chlorine for seed lac. Both are very tough, hard, and durable; the last almost colorless. *Used* for pictures, metal, wood, or leather.

VARNISH, LAC. *Syn.* LACQUER. *Prep.* I. Seed lac 3 oz.; turmeric 1 oz.; dragon's blood ¼ oz.; alcohol 1 pint; digest for a week, frequently shaking, decant and filter. Deep gold colored.

II. Ground turmeric 1 lb.; gamboge 1½ oz.; gum sandarach 3½ lbs.; shellac ¾ lb.; all in powder; rectified spirit of wine 2 gallons; dissolve, strain, and add turpentine varnish 1 pint. Gold colored.

III. Spanish annotto 3 lbs.; dragon's blood 1 lb.; gum sandarach 3¼ lbs.; rectified spirit 2 gallons; turpentine varnish 1 quart; dissolve and mix as the last. Red colored.

IV. Gamboge cut small 1 oz.; Cape aloes cut small 3 oz.; pale shellac 1 lb.; rectified spirit 2 gallons; as the last. Pale brass colored.

V. Seed lac, dragon's blood, annotto, and gamboge, of each ¼ lb.; saffron 1 oz.; rectified spirit of wine 5 quarts; as last.

⁂ Lacquers are used upon polished metals and wood to impart the appearance of gold. As they are wanted of different depths and shades of color, it is best to keep a concentrated solution of each coloring ingredient ready, so that it may at any time be added to produce any desired tint.

VARNISH, MAHOGANY. *Prep.* Sorted gum anime 8 lbs.; clarified oil 3 gallons; litharge and powdered dried sugar of lead, of each ¼ lb.; boil till it strings well, then cool a little, thin with oil of turpentine 5½ gallons, and strain.

VARNISH, MASTICH. *Syn.* PICTURE VARNISH. TURPENTINE VARNISH. *Prep.*—1. (*Fine.*) Very pale and picked gum mastich, 5 lbs.; glass pounded as small as barley, and well washed and dried, 2½ lbs.; rectified turpentine 2 gallons; put them into a clean 4 gallon stone or tin bottle, bung down securely, and keep rolling it backwards and forwards pretty smartly on a counter or any other solid place for at least 4 hours; when, if the gum is all dissolved, the varnish may be decanted, strained through muslin into another bottle, and allowed to settle. It should be kept for 6 or 9 months before use, as it thereby gets both tougher and clearer.

II. (*Second Quality.*) Mastich 8 lbs.; turpentine 4 gallons; dissolve by a gentle heat, and add pale turpentine varnish ½ gallon.

III. Gum mastich 6 oz.; oil of turpentine 1 quart; dissolve.

⁂ Mastich varnish is used for pictures, &c.; when good, it is tough, hard, brilliant, and colorless. Should it get "*chilled,*" 1 lb. of well-washed silicious sand should be made moderately hot, and added to each gallon, which must then be well agitated for 5 minutes, and afterwards allowed to settle.

VARNISH, OAK. *Prep.*—1. Clear pale rosin, 3½ lbs.; oil of turpentine 1 gallon; dissolve.—2. Clear Venice turpentine 4 lbs.; oil of turpentine 5 lbs.; mix. Both are good common varnishes for wood or metal.

VARNISH, OIL. *Prep.*—1. Rosin 3 lbs.; melt, add Venice turpentine 2 lbs.; pale drying oil 1 gallon; cool a little and thin with oil of turpentine 1 quart.—2. Rosin 3 lbs.; drying oil ½ gallon; melt and thin with oil of turpentine 2 quarts. Both the above are good varnishes for common work.

VARNISH, PICTURE. Several varnishes are called by this name. Pale copal or mastich varnish is generally used for oil paintings, and crystal, white hard spirit, or mastich varnish, for water-color drawings on paper.

VARNISH, SPIRIT. *Prep.* I. (*Brown Hard.*)—*a.* Sandarach 4 oz.; pale seed lac 2 oz.; elemi (true) 1 oz.; alcohol 1 quart; digest with agitation till dissolved, then add Venice turpentine 2 oz.—*b.* Gum sandarach 3 lbs.; shellac 2 lbs.; rectified spirit, (65 over proof,) 2 gallons; dissolve, add turpentine varnish 1 quart; agitate well and strain. Very fine.—*c.* Seed lac and yellow resin, of each 1½ lbs.; rectified spirit 2 gallons.

II. (*White Hard.*) *a.* Gum sandarach 5 lbs.; camphor 1 oz.; rectified spirit (65 over proof) 2 gallons; washed and dried coarsely-pounded glass 2 lbs.; proceed as in making mastich varnish; when strained add 1 quart of very pale turpentine varnish. Very fine.—*b.* Picked mastich and coarsely-ground glass, of each, 4 oz.; sandarach and pale clear Venice turpentine, of each 3 oz.; alcohol 2 lbs.; as last.—*c.* Gum sandarach 1 lb.; clear Strasburgh turpentine 6 oz.; rectified spirit (65 over proof) 3 pints; dissolve.—*d.* Mastich in tears 2 oz.; sandarach 8 oz.; gum elemi 1 oz.; Strasburgh or Scio turpentine (genuine) 4 oz.; rectified spirit (65 o. p.) 1 quart. *Used* on metals, &c. Polishes well.

III. (*Soft Brilliant.*) Sandarach 6 oz.; elemi (genuine) 4 oz.; anime 1 oz.; camphor ½ oz.; rectified spirit 1 quart; as before.

⁂ The above spirit varnishes are chiefly applied to objects of the toilette, as work-boxes, card-cases, &c., but are also suitable to other articles, whether of paper, wood, linen, or metal, that require a brilliant and quick-drying varnish. They mostly dry almost as soon as applied, and are usually hard enough to polish in 24 hours. Spirit varnishes are less durable and more liable to crack than oil varnishes.

VARNISH, STOPPING OUT. *Syn.* PETIT VERNIS. *Prep.* Lampblack made into a paste with turpentine. *Used* by engravers.

VARNISH, TRANSFER. *Syn.* MORDANT. *Prep.* Mastich in tears 6½ oz.; rosin 12½ oz.; pale Venice turpentine (genuine) and sandarach, of each 25 oz.; alcohol 5 pints; dissolve as before. *Used* for fixing engravings or lithographs on wood, and for gilding, silvering, &c. (See CRYSTAL VARNISH.)

VARNISH, TURPENTINE. *Prep.* Mastich

in tears 12 oz.; pounded glass 5 oz.; camphor ½ oz.; oil of turpentine 1 quart; digest with agitation till dissolved, then add Venice turpentine (pure) 1½ oz.; previously liquefied by a gentle heat, mix well, and the next day decant. Very fine. *Used* for paintings. See MASTICH.

VARNISH, WAINSCOT. The same as mahogany varnish, but using paler gum and oil. (See OAK VARNISH.)

VARNISH, WAX. *Prep.*—1. (MILK OF WAX.) White wax (pure) 1 lb.; melt with as gentle a heat as possible, add warm spirit of wine, sp. gr. 0·830, 1 pint; mix perfectly, and pour the liquid out upon a cold porphyry slab; next grind it with a muller to a perfectly smooth paste, with the addition of more spirit as required, put the paste into a marble mortar, make an emulsion with water 3½ pints, gradually added, and strain through muslin. *Used* as a varnish for paintings; when dry, a hot iron is passed over it, or heat is otherwise evenly applied, so as to fuse it, and render it transparent; when quite cold it is polished with a clean linen cloth. The most protective of all varnishes. Many ancient paintings owe their freshness at the present day to this varnish. Also used for furniture.—2. Wax 3 oz.; oil of turpentine 1 quart; dissolve by a gentle heat. *Used* for furniture.

VARNISH, WHITE. *Prep.* I. Tender copal 7½ oz.; camphor 1 oz.; alcohol of 95§, 1 quart; dissolve, then add mastich 2 oz.; Venice turpentine 1 oz.; dissolve and strain. Very white, drying, and capable of being polished when hard. *Used* for toys.

II. Sandarach 8 oz.; mastich 2 oz.; Canada balsam 4 oz.; alcohol 1 quart. *Used* on paper, wood, or linen.

VEGETABLES. VEGETABILIA, (P. L.) The following general directions are given in the London Pharmacopœia for the collection and preservatio of vegetable substances:

"VEGETABLES *are to be gathered* in dry weather, and when no dew nor rain is upon them; they are to be collected every year, and any which shall have been longer kept, are to be thrown away.

"ROOTS, for the most part, are to be dug up before their stems or leaves shoot forth.

"BARKS are to be collected at that season in which they are more easily separated from the wood." Spring is the season here alluded to; as at this time, after the sap begins to ascend, the bark is in general very easily separated.

"LEAVES are to be gathered after the flowers have expanded, and before the seeds are mature.

"FLOWERS are to be gathered when just opened." The red rose, however, must be gathered before the buds are expanded.

"SEEDS are to be collected when they are ripe, and before they drop from the plant. They ought to be preserved in their seed-vessels."

Pres. "VEGETABLES, soon after they are gathered, except those which are to be used in the recent state, are to be lightly spread out, and dried as quickly as possible, with a heat so gentle that their color will not be altered; and then preserved in proper situations or vessels, where the light and moisture are excluded.

"ROOTS, which are required to be preserved fresh, should be buried in dry sand. The SQUILL bulb, before it is dried, is to be denuded of the arid coats, and cut transversely into thin slices. The corms of colchicum, dug up in July or August, should be cut into thin transverse slices, dried without heat, or in a very gentle heat, and preserved in well-stopped bottles.

"PULPY FRUITS, if they be unripe, or ripe and dried, are to be placed in a damp situation until they become soft: then the pulp is to be pressed out through a hair sieve; afterwards boiled with a gentle heat, frequently stirring; and, finally, the water evaporated in a water-bath, until the pulp acquires a proper consistence.

"Over the bruised pods of CASSIA pour boiling water, so as to wash out the pulp, which is to be first pressed through a sieve with large holes, and afterwards through a hair sieve; then dissipate the water in a water-bath, until the pulp acquires a proper consistence.

"The PULP or JUICE of fresh and ripe *fruit* is to be pressed through a sieve without boiling it."

"GUM-RESINS are to be esteemed the best, which occur so free from admixture as not to require purification; but, if they appear less pure, boil them in water until they soften, and express them through a canvass cloth; then let the resinous portion subside, and evaporate the effused supernatant liquid in a water-bath, adding towards the end the resinous part, and mixing it well into one mass with the gummy part. Those gum-resins that *melt easily*, may be purified by enclosing them in an ox-bladder, and holding them in boiling water (or steam) until they become so soft that they can be separated from their impurities through a canvass cloth, by means of a press."

VEGETABLES AND THEIR JUICES *may also be preserved by heating in well-closed vessels.* The substances to be preserved are to be put into strong glass bottles, with necks of a proper size, corked with the greatest care, luted with a mixture of lime and soft cheese, spread on rags, and the whole bound down with wires across it. The bottles are then placed in an oven, the temperature of which is cautiously raised to 212°, or they are enclosed separately in canvass bags, and put into a copper of water, which is gradually heated till it boils, and thus kept for several minutes: the whole is then left to cool, and the bottles are taken out and carefully examined before they are laid by, lest they should have cracked, or the lute given way. (See FRUIT, MILK, PICKLES, PRESERVING, PUTREFACTION, VEGETABLE JUICES, VEGETABLES for distillation, &c.)

*** The generality of vegetable substances that exercise no very marked action on the human frame, may be taken in powder, in DOSES of a *drachm*, night and morning; or an ounce, or q. s. to impart a moderately strong taste or color may be infused, or boiled in 1 pint of water, and a wine-glassful or thereabouts, taken 2 or 3 times a day.

VEGETABLES FOR DISTILLATION. The Dublin College states that "HERBS and FLOWERS from which *oils* and *distilled waters* are to be obtained, should be dried as soon as they are collected." This method, however much recommended by authority or common usage, is vastly

inferior to the plan adopted by the large perfumers and many of the wholesale druggists, which consists in preserving the flowers and herbs by means of common salt. The objection which is raised against the use of fresh aromatic plants is thus obviated, while the odors of the products of distillation are rendered fully equal or superior to those obtained from the dried plant, fruit, or flowers, without the great loss and trouble attending the drying and preserving of them. Besides, many aromatic and odorous substances almost entirely lose their properties by drying; while most of them yield more oil, and that of a finer quality, in the *fresh* than in the *dried* state. The odor of roses, elder flowers, and a variety of others, are vastly improved by this treatment, and these flowers may thus be preserved with ease and safety from season to season, or even longer, if required. The *process* simply consists in intimately mixing the flowers, or other vegetables, soon after being gathered, with about ¼ their weight, or less, of good *dry* salt, and ramming down the mixture as tightly as possible into strong casks. The casks should then be immediately placed in a cold cellar, and covered with boards, on which heavy weights should be put to keep the mass tight and close.

VEGETABLE JUICES, (EXPRESSED.) The juices of plants are obtained by bruising the fresh leaves in a marble mortar, or in a mill, and expressing the juice, which, after defecation for some hours in a cool situation, is either filtered through paper, or strained after coagulating its albuminous matter by heat. Some plants require the addition of ⅛ of water before pressing. The expression of the juice of lemons, oranges, quinces, &c., is facilitated by previously mixing the pulp with clean chopped straw. Buckthorn berries, mulberries, &c., after being crushed between the hands, are left 3 or 4 days to undergo a slight fermentation, before pressing. A very powerful screw press is required for this purpose. The PRESERVATION of the juices of the narcotic plants, and some other vegetables, has lately assumed considerable interest, from these preparations having been proposed as substitutes for the common tinctures. It appears that the juice of young plants just coming into flower, yields only ⅔ the amount of extract which may be obtained from the same quantity of juice expressed from the matured plant, or when the flowers are fully blown, and the strength of the product is also inferior. The leaves alone should be preferably employed, and should be exclusively of the second year's growth, when the plants are biennials. (Squire.) Vegetable juices preserved with alcohol, (*preserved vegetable juices, Succi alcoholati, Alcoholatures,*) are prepared as follows:—

I. (Bentley.) Bruise the leaves in a marble mortar, (on the large scale, in a mill,) and submit them to the action of a powerful press; allow the juice to remain for 24 hours in a cold place, then decant the clear portion from the feculence, add ¼ part by measure of rectified spirit, (56 over proof,) agitate, and in 24 hours again decant the clear, and filter it through paper Keeps well under ordinary circumstances.

II. (Squire.) As the last, but adding to the decanted juice *one-half* its volume of rectified spirit. Keeps as well as the corresponding tinctures.

III. (Giesecke.) As the last, but using only one-fifth rectified spirit.

IV. To the clear depurated juice, add one-fortieth part by weight of alcohol, in 24 hours filter, cork down close, and preserve the bottle sunk up to its neck in sand, in a cool cellar.

Remarks. The juices preserved by Mr. Bentley, or after his method, are now those generally employed and approved of by the profession, as may be seen from the numerous testimonials from the leading medical authorities in their favor. These preparations have been extensively tried, and in no instance have they failed in producing the most decided and characteristic effects of the plants from which they are prepared. At a moderate temperature they will keep any length of time. Occasionally there is a slight tendency to deposite, but the sediment has been carefully examined and found not to contain any of the medicinal virtues of the plant. They are confidently recommended by Mr. Bentley as being superior to most other preparations of the like nature, from containing less SPIRIT. The commencing dose of the narcotic juices is about 5 drops. *** In the above manner are prepared the *preserved juices of aconite, belladonna, colchicum,* (corms,) *hemlock, henbane, foxglove, elaterium, lactuca virosa, taraxacum,* &c.

VEGETATION, METALLIC. *Prep.* 1. (*Tin Tree.*) Muriate of tin 3 drs.; nitric acid 10 to 15 drops; distilled or rain water 1 pint; dissolve in a white glass bottle, and hang in it by a thread, a small rod of zinc.

II. (*Lead Tree. Arbor Saturni.*) Sugar of lead 1 oz.; distilled water 1½ pint; acetic acid 2 drops; dissolve, and suspend a piece of zinc in it, as before. Less lustrous and beautiful than the last.

III. (*Silver Tree. Arbor Dianæ.*) Nitrate of silver 20 grs.; water 1 oz.; dissolve in a vial, and add about ½ dr. of mercury. Very brilliant and beautiful.

*** In the above experiments, the metals are precipitated in an arborescent form. It is curious to observe the laminæ shoot out, as it were, from nothing, assuming forms resembling real vegetation. This phenomenon seems to result from a galvanic action being set up between the liquid and the metals.

VELVET PAINTING. Any of the ordinary non-corrosive pigments or liquid colors, thickened with a little gum, may be employed in this art; preference being, however, given to those that possess the greatest brilliancy, and which dry without spreading.

VENTILATION. It is essential to health that the habitations occupied by us should be free of impure air and all noxious vapors. The first step towards this end is to effect and maintain a liberal circulation of fresh air, either by ventilators, or by regularly opening the windows for stated daily periods. The kindling of fires also promotes the circulation of atmospheric currents. Noxious effluvia may be most effectually removed by occasional sprinklings of a solution of chloride of lime upon the floors and walls, the windows being kept open the while. It is always proper, also, that an infected house should be whitewashed Lives are sometimes lost by sleeping in a close room in which charcoal is burning, the person in

this case being stifled with the noxious gas. We advise that every sleeping apartment should be well ventilated, and that no one should go to bed with charcoal burning in the grate or stove. (See DISINFECTANTS, FUMIGATION, &c.)

VERATRINE. *Syn.* VERATRIA, (P. L. & E.) VERATRINA. SABADILLIN. A vegetable alkali, discovered by Pelletier and Caventou in the seeds of veratrum sabadilla, (asagræa officinalis,) in meadow saffron, and white hellebore. *Prep.* (P. L.) Boil sabadilla seeds lb. ij with rectified spirit 1 gallon for an hour, in a retort with a receiver fitted to it, decant the solution, boil the residue with another gallon of spirit and that which has distilled, pour off the liquor, and boil with fresh spirit a third time; press the sabadilla, distil the spirit from the liquors mixed and strained, evaporate the residue to the consistence of an extract, boil this three or more times in water acidulated with a little diluted sulphuric acid, and evaporate the strained liquor with a gentle heat to the consistence of sirup; to this, when cold, add magnesia to saturation, assiduously stirring, then press and wash two or three times; next dry the residue, and digest it two or three times in spirit with a gentle heat, and strain as often; distil off the spirit, boil what remains with animal charcoal in water, acidulated with sulphuric acid, for ½ hour, strain, well wash the charcoal, evaporate the liquors carefully to the consistence of sirup, precipitate by ammonia, wash, and dry.

Remarks. Pure veratria is perfectly white; but as usually met with, it has more or less of a brownish or grayish tint. It is odorous, acrid, uncrystallizable, fusible at 240° F., scarcely soluble in water, sparingly so in ether, but freely soluble in alcohol. With the dilute acids it forms salts; with sulphuric acid it strikes an intense red color. A dilute acetic solution of veratria is precipitated *white* by tincture of galls and by ammonia, and is turned to a *superb red* by strong sulphuric acid. The *smallest portion* of its powder causes violent sneezing. "As an external application, it has been efficaciously employed by Majendie in France, and Dr. Turnbull in this country; but the extravagant eulogies of the latter have not tended to confirm the reputation of the remedy. From 6 to 12 grs. dissolved in f ℥j of alcohol as a liniment, or 30 grs. mixed with ʒj of olive oil and ℥j of lard as an ointment, have been employed in neuralgia, and other painful affections, and in gouty and rheumatic paralysis. If it be internally employed, the dose should not exceed one-sixteenth part of a grain; and the action of even this minute dose should be watched. In large doses, it is a *powerful irritant poison.*"

VERATRIC ACID. A crystalline, fusible, volatile acid, soluble in alcohol, slightly so in water, and insoluble in ether, found by Merck in the seeds of sabadilla. It is obtained by exhausting the bruised seed with alcohol and sulphuric acid, and precipitating the filtered solution by milk of lime; veratrate of lime remains in solution. This salt is decomposed by hydrochloric acid, and the veratric acid crystallizes.

VERDIGRIS. *Syn.* DIACETATE OF COPPER. SUBACETATE OF DO. VERT-DE-GRIS, (*Fr.*) GRÜNSPAN, (*Ger.*) ÆRUGO; CUPRI DIACETAS IMPURA, (P. L.) When this article is of good quality, "it is partly dissolved in water; and is almost entirely soluble in liquor of ammonia, and, with the assistance of heat, in diluted sulphuric acid." (P. L.) "Not above 5% of impurity should be left." (P. E.) (See ACETATE OF COPPER. *Ant.* See COPPER.)

VERDIGRIS, ENGLISH. *Prep.* I. Blue vitriol 24 lbs.; white vitriol 16 lbs.; sugar of lead 12 lbs.; alum 2 lbs.; all coarsely powdered; mix, and heat them in a pot over the fire till they unite into a mass.

II. (*Distilled or crystallized.*) Sulphate of copper 12½ lbs.; dissolve in water, and add a solution of 19 lbs. of sugar of lead, or q. s.; filter, evaporate, and crystallize. Both are used as substitutes for foreign verdigris.

VERDITER, (BLUE.) *Syn.* REFINERS' VERDITER. CENDRES BLEUES. A blue pigment, obtained by adding chalk, whiting, or milk of lime, to the solution of copper in aquafortis; or by triturating recently precipitated and still moist carbonate or oxide of copper with hydrate of lime. *Prep.* A quantity of whiting, or milk of lime, is put into a tub, and upon this the solution of copper is poured. The mixture is to be stirred every day for some hours together, till the liquor loses its color. The liquor is then to be poured off, and more solution of copper is to be added. This is to be repeated till the whiting has acquired the proper color. Then it is to be washed with water, spread on large pieces of chalk, and dried in the sun.

Remarks. The cupreous solution employed in the above process, is made by neutralizing the nitric solution obtained from the refiners of gold and silver, by heating it along with metallic copper. For the finest qualities of verditer the lime should be of the purest kind, and the cupreous precipitate should be carefully triturated with it, after it is nearly dry, by which a fine velvety color is produced. The *cendres bleues en pâtes* of the French differs from the above mainly in a solution of muriate of copper being employed, and in the resulting green precipitate being turned blue by the action of carbonate of potash. Verditer is either dried into a powder, or used as a water color in the moist state.

VERDITER, (GREEN.) The process for refiners' verditer frequently miscarries, and a green color is produced instead of a blue. It may also be obtained by omitting the "blueing up" with potash, mentioned above.

VERMICELLI. This is prepared from a stiff paste made of a peculiar, fine kind of granular wheat flour called *semoule,* which is mixed up with hot water, and, after being well kneaded, is formed into small ribands, cylinders, or tubes, by being placed in a vertical cylinder press, the bottom of which is filled with proper shaped holes, through which it is driven by the iron plate or "follower" being forced down by means of a powerful screw. The pieces that protrude are broken off, twisted into the desired shape upon paper, and dried. (See MACARONI.)

VERMILION. *Syn.* FACTITIOUS CINNABAR. BISULPHURET OF MERCURY. *Prep.* I. By SUBLIMATION.—*a.* Mercury 202 parts; sulphur 33 parts; fuse together by a gentle heat, observing not to allow the mass to take fire; when fused, cover over the vessel, cool, powder, and sublime in a

close vessel, so placed in a furnace that the flame may freely circulate and play upon it to about half its height. The heat should be at first gradually applied, and afterwards augmented till the lower part of the subliming vessel becomes red hot. When cold, the sublimate is broken to pieces, ground along with water to a fine powder, elutriated, passed through a sieve, and dried. *Prod.* About 112⅝ of the weight of the mercury employed.—*b.* By grinding 170 lbs. of quicksilver and 50 lbs of brimstone together, throwing the mixture by ladlefuls into heated earthen sublimers, where it takes fire; the superfluous sulphur being consumed, the mouths of the vessels are then covered with tiles, which stops the conflagration, and the sublimation commences, which is continued until the whole is risen up.

Remarks. It is said that the rich tone of Chinese vermilion may be imitated by adding to the materials 1⅝ of sulphuret of antimony, and by digesting the ground sublimate, first in a solution of sulphuret of potassium, and next in diluted muriatic acid, after which it must be well edulcorated with water, and dried.

Prod. 10 lbs. for every 9 lbs. of mercury employed.

II. In the humid way.—*a.* (Brunner.) Pure quicksilver 300 parts; pure sublimed sulphur 114 parts; triturate together for several hours till a *perfect* ethiops is formed, and add gradually caustic potassa 75 parts, dissolved in water 450 parts; continue the trituration for some time, then gently heat the mixture in an iron vessel, at first constantly stirring, but afterwards only from time to time, observing to keep the heat at about 113°, or, at all events, under 122° F., and to add fresh water to compensate for the portion evaporated. When the color begins to redden, great caution is requisite to preserve the mixture at the lower temperature, and to keep the sulphuret of mercury perfectly pulverulent; as soon as the color becomes nearly *fine*, the process must be conducted with increased caution, and at a lower heat for some hours, or till a rich color is produced, when the vermilion must be elutriated with water, to separate any particles of metallic mercury, and carefully dried. *Prod.* 332 parts of vermilion, equal in brilliancy to the finest Chinese.

b. Mercury 300 parts; sulphur 150 do.; potassa 152 do.; water 450 do.; proceed as last, taking care to keep the heat under 130°. *Prod.* 382 parts. *** Vermilion is a beautiful and permanent red pigment, and works and covers well both in oil and water. (See Bisulphuret of Mercury.)

VESICANTS. *Prep.*—1. (*Vesicant Taffeta. Blistering Cloth. Pannus Vesicatorius. Sparadrap Vesicans.*) Distil off the ether from a concentrated ethereal tincture of cantharides, melt the oily residue with twice its weight of wax, and spread it on thin oiled silk, (P. Cod.,) or on cloth prepared with wax plaster.*—2. (*Blistering Tissue. Tela Vesicatoria.*) Similar to the last.—3. (*Blistering paper. Charta Vesicatoria.*) As above.—4. (*Blistering paper. Epispastic do. Papier Epispastique.* Henry and Guibourt.) White wax 8 parts; olive oil 4 parts; spermaceti 3 parts; turpentine, and powdered flies, of each 1 part; water 10 parts; boil slowly with constant agitation for 2 hours, strain through flannel, without pressure, and spread the mass before it cools on paper. *** All the above are used as substitutes for the ordinary blistering plaster.

* White wax ℥viij; olive oil ℥iv; melt together, and add turpentine ℥j. This plaster spread on cloth forms the *Toile préparée à la cire* of the French. (Henry and Guibourt.)

VESICATORIN. *Syn.* Cantharidin. Cantharides-camphor. The blistering principle of Spanish flies discovered by M. Robiquet. *Prep.* 1. Prepare a concentrated tincture of cantharides by percolating the powder with alcohol, and abandon it to spontaneous evaporation; the cantharidin slowly crystallizes, and may be purified by washing with *cold* alcohol, boiling with alcohol and animal charcoal, filtering, and again allowing the solution to crystallize.—2. Digest the aqueous extract of cantharides in alcohol, filter, evaporate to dryness, digest in sulphuric ether, evaporate, and slightly wash the resulting crystals with cold alcohol. *** Micaceous plates resembling spermaceti; fusible, vaporizable; insoluble in water; soluble in ether, oils, and hot alcohol; powerfully *vesicant* and *poisonous*. Its vapor, even at ordinary temperatures, frequently produces temporary blindness. The 1-100th part of a grain, placed on a piece of paper, and applied to the edge of the lower lip, caused small blisters in 15 minutes, which, when rubbed with a little simple cerate, extended over a large surface, and covered both lips with blisters. (Robiquet.)

VINEGAR. *Syn.* Acetum, (*Lat.*) Vinaigre, (*Fr.*) Essigsaure, (*Ger.*) Vinegar is dilute acetic acid, more or less contaminated with gum, sugar, and other vegetable matter.

The ordinary colored vinegar consumed in England (*malt vinegar; acetum*, P. L.; *acetum Britannicum, British vinegar*, P. E.) is prepared from malt, or a mixture of malt and barley, which is mashed with hot water, and the resulting wort is fermented as in the common process of brewing. The liquor is then run into barrels, placed endways, tied over with coarse canvass, and arranged side by side in darkened chambers, moderately heated by a stove, and properly supplied with air. Here it remains till the acetous fermentation is nearly complete, which usually occupies several weeks, or even months. The vinegar is next run off into two large tuns, furnished with false bottoms, on which "rape" (the pressed cake from making domestic wines, or the green twigs or cuttings of vines) is placed. One of these vessels is wholly, and the other only three-fourths filled. The fermentation commences and proceeds more rapidly in the latter than in the former tun, and the liquor it contains consequently matures sooner. When fit for sale, a portion of the vinegar is withdrawn from the smaller quantity, and its place supplied with a like quantity from the full tun, and this in its turn is refilled from the barrels before noticed. This process is carried on with a number of tuns at once, which are all worked in pairs. Malt vinegar was formerly wholly made by placing the wort in casks, loosely covering the bungholes with tiles, and exposing them to the joint action of sun and air for several months, till the acetification was complete. *** The general properties of this

kind of vinegar are well known. Its pleasant and refreshing odor is derived from acetic acid and acetic ether. Its strength is distinguished by the makers as Nos. 18, 20, 22, 24, the last of which is the strongest, and usually contains about 4·6§ of real acetic acid. Its density varies according to the quantity of foreign matter it contains. Sp. gr. 1·006 to 1·012, (P. E.;) 1·019, (Phillips;) 1·0135 to 1·0251, (Thomson.) This vinegar usually contains a small quantity of sulphuric acid.

Wine Vinegar (vinaigre d'Orléans, French vinegar, acetum Gallicum, P. E., acetum vini, P. D.) is prepared in wine countries by a similar process to that employed for making malt vinegar. That prepared from white wine (*White Wine Vinegar*) is most esteemed. It is purer and pleasanter than malt vinegar. Sp. gr. 1·014 to 1·022, (P. E.;) 1·016, (Phillips.) It usually contains from 5 to 6§ of acetic acid.

German, or quick method of making Vinegar. We have seen that acetification consists in the mere oxidation of alcohol in contact with organic matter. This fact has led to the adoption of an improved method of making vinegar, which consists in the direct employment of dilute alcohol, and in vastly enlarging the surface of the liquid exposed to the air. "This is effected by causing a mixture of 1 part of alcohol at 80 per cent., 4 to 6 parts water, $\frac{1}{1000}$ of ferment, honey, or extract of malt, to trickle down through a mass of beech shavings steeped in vinegar, and contained in a vessel called a vinegar generator (*essigbilder*) or graduation vessel. It is an oaken tub, narrower at the bottom than at the top, furnished with a loose lid or cover, below which is a perforated shelf, (colander or false bottom,) having a number of small holes loosely filled with packthread about 6 inches long, and prevented from falling through by a knot at the upper end. The shelf is also perforated with four open glass tubes, as air vents, each having its ends projecting above and below the shelf. The tub at its lower part is pierced with a horizontal row of eight equidistant round holes, to admit atmospheric air. One inch above the bottom is a syphon-formed discharge pipe, whose upper curvature stands one inch below the level of the air-holes in the side of the tub. The body of the tub being filled with beech chips, the alcoholic liquor (first heated to between 75° and 83° F.) is placed on the shelf. It trickles slowly down through the holes by means of the packthreads, diffuses itself over the chips, slowly collects at the bottom of the tub, and then runs off by the syphon pipe. The air enters by the circumferential holes, circulates freely through the tub, and escapes by the glass tubes. As the oxygen is absorbed, the temperature of the liquid rises to 100° or 104° F., and remains stationary at that point while the action goes on favorably. The liquid requires to be passed three or four times through the cask before acetification is complete, which is in general effected in from 24 to 36 hours." (Pereira, Mat. Med. I. 391-2.) A mixture of about 80 gallons of water, 9 gallons of spirit of from 44 to 45§ Tralles, and 3 gallons of vinegar, containing 3·5§ of real acid, forming together 92 gallons, yields on an average an almost equal quantity of vinegar, from 90 to 91 gallons, of the above-stated strength. (Knopp.)

Wood Vinegar is obtained by the destructive distillation of wood in iron cylinders.

Other Vinegars.—Cider Vinegar. From cider worked as malt vinegar.—*Sugar Vinegar.* Brown sugar 4 lbs. to each gallon of water; worked as last.—*Gooseberry Vinegar.*—From bruised gooseberries and brown sugar 1¼ lbs. to each gallon of water; worked as last.—*Raisin Vinegar.* From the marc left from making raisin wine. 1 cwt. to 15 gallons of water, along with a little yeast; worked as malt vinegar.—*Pickling Vinegar,* (British white wine do.) As malt vinegar, but paler and stronger.—*Ale Vinegar,* (alegar, acetum cerevisiæ.) From strong pale ale, worked upon fine cuttings or rape; as the last.—*Crystal Vinegar* Pickling vinegar 1 gallon, agitated with fresh-burnt animal charcoal for 24 hours, and then decanted or filtered. *Used* for pickles.—*Argol Vinegar,* (acetum ex tartaro.) White argol or cream of tartar lb. j; boiling water 2 gallons; dissolve, cool, add proof spirit 3 pints, and keep it lightly covered in a warm place till ripe. White and pleasant.—*German household Vinegar.* Soft water 7½ gallons; honey or brown sugar 2 lbs.; cream of tartar 2 oz.; corn spirit 1 gallon; as last.

⁂ See Acetic Acid, Acetification, Acetometry, Fermentation, and Pyroligneous Acid.

VINEGAR, AROMATIC. *Syn.* Aromatic Spirit of Vinegar. Acetum aromaticum. *Prep.* I. (P. Cod.) Acetic acid ℥xx; camphor ℥ij; oil of cloves ʒss; oils of cinnamon and lavender, of each 9 drops; mix.

II. (*Acidum aceticum aromaticum,* P. E.) Rosemary and origanum, dried, of each ℥j; dried lavender ℥ss; bruised cloves ʒss; acetic acid 1½ pints; digest a week, press, and filter. This wants the addition of about ℥iss of camphor.

III. (*Henry's.*) Glacial acetic acid strongly scented with the oils of cloves, lavender, rosemary, and calamus aromaticus, to which camphor is added. This is the formula adopted at Apothecaries' Hall.

IV. Glacial acetic acid 1 lb.; oil of cloves ʒj; oil of rosemary ℈ij; oils of bergamotte and cinnamon, of each ʒss; oil of pimento 24 grs.; oil of lavender ℈j; neroli 10 drops; camphor ℥j; alcohol ℥ss; mix. Very fine.

V. (*Extemporaneous.*) Acetate of potash (dry) ʒj; oil of vitriol 20 drops; oils of lemons and cloves, of each 3 drops. ⁂ Aromatic vinegar is used as a pungent and refreshing perfume in faintness, &c. For this purpose it is usually dropped on a small piece of sponge placed in a stoppered bottle or a vinaigrette. It is corrosive, and should be therefore kept from contact with the skin and clothes.

VINEGAR, THE CAMP. *Prep.* Sliced garlic 8 oz.; Cayenne pepper, soy, and walnut ketchup, of each 4 oz.; 36 chopped anchovies; vinegar 1 gallon; powdered cochineal ¼ oz.; macerate for 1 month, and strain.

VINEGAR, CAMPHORATED. *Syn.* Acidum aceticum camphoratum. *Prep.* (P. E.) Concentrated acetic acid f℥viss; camphor ℥ss; dissolve. *Used* as aromatic vinegar.

VINEGAR OF CANTHARIDES. *Syn.* Acetum Cantharidis, (P. L. & E.) *Prep.* (P. L.) Powdered cantharides ℥ij; acetic acid, P. L., 1 pint; digest for 8 days, press, and strain. *Used*

as a counter-irritant, and to raise blisters. Many wholesale houses employ twice the above quantity of flies.

VINEGAR, CUCUMBER.—*Capsicum Vinegar,—Garlic Vinegar,—Shalote Vinegar,—Onion Vinegar,—Caper Vinegar,—Cress Seed Vinegar,—Celery Seed Vinegar,—Truffle Vinegar,—Seville Orange-peel Vinegar,—Ginger Vinegar,—Black Pepper Vinegar,—White Pepper Vinegar,—Chillie Vinegar,—Horseradish Vinegar, &c.*, are all made by steeping about an oz. of the articles in each pint of vinegar for 14 days, and straining.—TARRAGON VINEGAR,—*Basil Vinegar,—Green Mint Vinegar,—Elder-flower Vinegar,—Celery Vinegar,—Cherville Vinegar,—Burnet Vinegar, &c.* Leaves 2 or 3 oz.; vinegar 1 pint; steep for 14 days, then strain, and keep in half-pint bottles. The whole are used in cookery.

VINEGAR, CURRIE. *Prep.* Currie powder ½ lb.; vinegar 1 gallon; infuse for 1 week. *Used* as a flavoring.

VINEGAR, DISTILLED. *Syn.* ACETUM DESTILLATUM, (P. L. E. & D.) *Prep.* (P. L.) Malt vinegar 1 gallon; distil in glass, (or earthenware,) reserving the first 7 pints only for use. *** If a pewter worm is used, a portion of lead is dissolved, and the product becomes cloudy. 100 grs. should saturate 13 grs. of crystallized carbonate of soda. It contains about 4·6§ of real acetic acid. (See ACETIC ACID.)

VINEGARS FROM FLOWERS. *Prep.* Dried flowers 1 to 2 oz.; distilled vinegar 1 pint; digest for a week, strain, and repeat the process with fresh flowers, if necessary. They may also be prepared by adding 2 or 3 drops, or q. s. of the respective essential oils to the vinegar. *** In a similar way are made the *Vinegars of—orange-flowers,* (fresh,) *elder-flowers, clove-gilly flowers, musk roses, red roses,* (vinaigre de rose, acetum rosatum,) *rosemary flowers,* (vinaigre de rosemarin, acetum anthosatum,) *lavender,* (vinaigre distillé de lavende,) *Tarragon, &c. &c.*

VINEGAR, MARSEILLES. *Syn.* VINEGAR OF THE FOUR THIEVES. PROPHYLACTIC VINEGAR. ACETUM PROPHYLACTICUM. A. ANTISEPTICUM. A. THERIACALE. A. QUATUOR FURUM. VINAIGRE DES QUATRE VOLEURS. *Prep.* Summits of rosemary, flowers of sage, dried, of each ℥iv; dried lavender flowers, ℥ij; cloves ʒj; distilled vinegar 1 gallon; digest for 7 days, press, and filter. *Used* as a corrector of bad smells, and formerly as a prophylactic against the plague, and other contagious diseases. Said to be a favorite preventive with Cardinal Wolsey, who always carried some with him.

VINEGAR OF OPIUM. *Syn.* ACETUM OPII, (P. E. & D.) *Prep.* (P. E.) Opium ℥iv; distilled vinegar f℥xvj; macerate for 7 days, press, and filter. Anodyne and soporific. Preferable to laudanum. *Dose.* 5 to 30 drops.

VINEGAR, RASPBERRY. *Prep.* Bruised ripe raspberries and white wine vinegar, of each 3 pints; macerate 24 hours, press, strain, and to each pint add white sugar 1 lb.; boil, skim, cool, and to each pint add brandy 2 oz. *** In a similar way may be made *Strawberry Vinegar,* and *Cherry do.*

VINEGAR OF SQUILLS. *Syn.* ACETUM SCILLÆ, (P. L. E. & D.) A. SCILLITICUM, (P. L. 1745.) *Prep.*—1. (P. L.) Squills, recently dried, ℥xv; distilled vinegar 6 pints; digest at a gentle heat for 24 hours, press, filter, and add proof spirit ½ pint.—2. (*Wholesale.*) Squills 7 lbs.; distilled vinegar 7 gallons; macerate in the cold for 10 days, press, and filter. Expectorant and diuretic *Dose.* ʒss to ʒiss in chronic pulmonary affections and dropsies.

VIOLET DYE, like purple, is produced by a mixture of red and blue coloring matter, applied either together, or in succession. A good violet may be given to *silk* or *wool* by passing it first through a solution of verdigris, then through a decoction of logwood, and lastly through alum water. A *fast violet* may be given by dying the goods a crimson with cochineal, without alum or tartar, and, after rinsing, passing them through the indigo vat.—*Linens or cottons* are first galled with 18§ of gall-nuts, next passed through a mixed mordant of alum, iron liquor, and sulphate of copper, working them well, then worked in a madder bath made with an equal weight of root, and lastly brightened with soap or soda. Another good method is to pass cloth dyed Turkey red through the blue vat.—*Wool, silk, cotton, or linen,* mordanted with alum and dyed in a logwood bath, or a mixed bath of Archil and Brazil, also takes a pretty, but false violet.

VIOLINE. *Syn.* VIOLINA. EMETIQUE INDIGENE. A white, pulverulent, bitter, acrid substance, extracted from the roots, leaves, flowers, and seeds of the viola odorata. It is sparingly soluble in water, and insoluble in ether. Its operation resembles emetine, for which it was at first mistaken.

VOMIT, (MARRIOTT'S,) DRY. A mixture of equal parts of sulphate of zinc and tartar emetic.

WAFERS. *Prep.* I. (*Flour wafers.*) Mix fine wheat flour with water to a smooth pap, add coloring as required, pass the mixture through a sieve, to remove any clots or lumps, fill the '*wafer-irons*' (previously warmed, and greased with butter or olive oil) with the batter, close them tight, and expose them for a short time to the heat of a clear charcoal fire. The whole must then be allowed to cool, when the irons must be opened, and the thin cake, which is now hard and brittle, must be cut into wafers, by means of sharp annular steel punches. *** The '*wafer-irons*' consist of two plates of iron, united together in a similar manner to a pair of pincers or tongs, and which, when closed, leave a space between their internal surface proper for the thickness of wafers.

II. (*Gelatin do., Glue do., Transparent do.*) Dissolve isinglass, or the best pale glue, in sufficient water to form a consistent mass when cold, pour it, while hot, upon the surface of a warm plate of mirror glass, slightly oiled, and surrounded with a border of card paper, (laid flat;) next apply a similar plate, also warmed and oiled, and press the two into as close contact as is permitted by the card paper. When cold, the thin cake of gelatin must be removed, and cut into wafers with punches, as before.

III. (*Medallion.*) Color Salisbury glue; fill up the hollow part of a seal with gum water mixed with any colored powder, leaving the flat part

clear; then pour as much of the melted colored glue on the seal as will lie upon it, and let it dry in a gentle heat; when used. wet the paper where the wafer is to be applied, and place the back of the wafer upon the wet paper.

*** The coloring matters employed for wafers are the following:—*Red*, a decoction of Brazil wood, brightened with alum;—*yellow*, a decoction of French berries, or an infusion of saffron or turmeric;—*blue*, sulphate of indigo diluted with water, and partly saturated with potash; *green*, blue and yellow mixed. Vermilion, gamboge, smalts, &c., are also used for the best wafers.

WAFERS. (In cookery.) *Prep.* Take fine flour, dried and sifted, make it into a smooth thin batter with very good milk, or a little cream and water; add about as much white wine as will make it thick enough for pancakes, sweeten it with a little loaf-sugar, and flavor with beaten cinnamon. When thus prepared, have the wafer-irons made ready by being heated over a charcoal fire; rub the irons with a piece of linen cloth dipped in butter; then pour a spoonful of the batter upon them, and close them almost immediately; turn them upon the fire, and pare the edges with a knife, as some of the batter will ooze out. A short time will bake them, when the irons are properly heated. The wafers must be curled round while warm. Wafer Paper is prepared in a similar way to the above. *Used* by cooks, &c.

WARD'S RED DROP. A strong solution of emetic tartar in wine.

WARTS on the hands may be removed by the daily use of a little nitrate of silver, or nitric or acetic acid, in the way described at p. 222, (art. Corns.) The first of the above applications produces a black stain, and the second a yellow one; both of which, however, wear off after the lapse of some days. Acetic acid scarcely discolors the skin. The papular eruption which covers the hands of some persons, and which is occasionally called "*soft warts*," is best removed by the daily use of Gowland's lotion.

WASH FOR FRECKLES. *Prep.* Brandy 1½ oz., (or spirits of wine 1 oz.,) water 9 oz., diluted muriatic acid, a teaspoonful; mix. To be used after washing. The substitution of 1 oz. of orange-flower water, or 2 oz. of rose-water, for a like proportion of the water ordered above, renders it much more agreeable.

WASH FOR THE TEETH. *Prep.* Chloride of lime ¼ oz.; water 2 oz.; agitate well together in a vial for ½ an hour, filter, and add spirit 2 oz., rose or orange-flower water 1 oz. *Used* diluted with water, by smokers and persons having a foul breath.

WATCHFULNESS. *Syn.* Sleeplessness. Agrypnia, (from *a*, priv. and ὕπνος, *sleep*.) The common causes of watchfulness are thoughtfulness or grief, a disordered stomach or bowels, heavy and late suppers, or deficiency of proper exercise. The best treatment in ordinary cases consists in an attention to those points. The method of producing sleep recommended by a late celebrated Hypnotist, consisted in merely adopting an easy recumbent position, inclining the head towards the chest, shutting the eyes, and taking several deep inspirations with the mouth closed. *Another method* recommended by an eminent surgeon, and which appears infallible if *persevered in with proper confidence*, and which is suitable either to the sitting or recumbent posture, consists in tying a decanter cork with a metallic top, or any other bright object, on the forehead, in such a position that the eyes must be distorted or strained to be capable of seeing it. By resolutely gazing in this way for a short time, *without winking*, the muscles of the eyes gradually relax, and the experimenter falls asleep.

WATER. *Syn.* Protoxide of Hydrogen. Eau, (*Fr.*) Agua, (*Sp.*) Acqua, (*Ital.*) Wasser, (*Ger.*) Aqua, (*Lat.*) ὕδωρ, (*Gr.*) The ancients regarded water as a simple substance, and as convertible into earth, and various organic products. Earth, air, fire, and water, were at one time conceived to be the elementary principles, or essences of matter, from which all form and substance derived their existence. The true constitution of water was not discovered till about the middle of the last century, when the Honorable Mr. Cavendish proved that this liquid was a compound of hydrogen and oxygen. These gases exist in water in the proportion of 1 to 8 by weight, or 2 to 1 by volume; the sp. gr. of hydrogen being to that of oxygen as 1 to 16. When water is made a part of the voltaic circuit, it is resolved into 2 measures of hydrogen, and 1 measure of oxygen gas; and if the gases thus obtained be mixed, and exploded by the electric spark, they again combine, and produce their own weight of pure water. The composition of water is thus clearly and easily demonstrated, by analysis and synthesis. In the production of water from its constituent gases, there is a condensation of nearly 2000 volumes into 1, thus showing the wonderful effects of chemical combination. One cubic inch of perfectly pure water at 62° F., and 30 inches of the barometer, weighs 252·458 grs.; by which it will be seen that it is 815 times heavier than atmospheric air. Its sp. gr. is 1·0, it being made the standard by which the densities of other bodies are estimated. The sp. gr. of frozen water (ice) is 0·92; that of aqueous vapor 0·6202, air being 1·0. Water changes its volume with the temperature; its greatest density is at about 39° F., and its sp. gr. decreases from that point, either way. By the enormous pressure of 30,000 lbs. on the square inch, 14 volumes of water are condensed into 13 volumes. Water evaporates at all temperatures, but at 212° this takes place so rapidly, that it boils, and is converted into vapor, (steam,) whose bulk is about 1700 times greater than that of water. The general properties and uses of water are too well known to require notice.

Pur. Pure water is perfectly transparent, odorless, and colorless, and evaporates without residue, or even leaving a stain behind. The purest natural water is that obtained by melting snow or frozen rain, that has fallen at some distance from any town. Absolutely pure water can only be obtained by the union of its gaseous constituents; but very pure water, sufficiently so for all chemical and philosophical purposes, may be procured by the careful distillation of common water. The following are the tests usually employed to ascertain the purity of water, or the nature of the substances it holds in solution:—1. Ebullition. If a precipitate is formed, or a crust deposited on the vessel. it indicates the presence of carbonate of lime. This is

the cause of the calcareous fur that lines tea-kettles and boilers used for common water.—2. Evaporation. The matter left behind when water is evaporated is impurity; if it be organic matter, smoke and a peculiar odor will be evolved, as the residue becomes dry and charred.—3. Protosulphate of Iron. If a little of this test be added to water, placed in a stoppered vial, and a reddish brown precipitate form in a few days, the presence of *oxygen gas* is indicated.—4. Neither Litmus, *sirup of violets*, nor *turmeric*, is discolored or affected when moistened with pure water; if the *first two* are *reddened*, it indicates an Acid; if the *last* is turned *brown* an Alkali.—5. Lime-water, mixed with pure water, remains transparent; if a milkiness ensues when the test is employed *before* the water has been boiled, and *not after*, carbonic acid is present.—6. Chloride of Barium occasions a white precipitate, insoluble in nitric acid, in water containing sulphuric acid, (usually in the state of sulphate of lime.)—7. Oxalate of Ammonia occasions a white precipitate in water, containing carbonate or sulphate of lime.—8. Nitrate of Silver occasions a cloudy white precipitate, insoluble in nitric acid, but soluble in ammonia, in water containing chlorine or muriates.—9. Phosphate of Soda and Ammonia added to water that has been boiled, and precipitated by oxalic acid, (if required,) produces, in a few hours, a white precipitate, if the water contains magnesia.—10. Tincture or Infusion of Galls turns water containing iron *black;* when this takes place both before and after the water has been boiled, the metal is present under the form of sulphate; but if it only occurs before boiling, then carbonate of iron may be suspected, and will be precipitated as a reddish powder by exposure and heat.—11. Ferrocyanide of Potassium gives a blue precipitate in water containing a sesquisalt of iron, and a white one, turning blue by exposure to the air, in water containing a protosalt of iron.—12. Sulphureted Hydrogen and the hydrosulphurets give a brown or black precipitate in water containing iron or lead.—13. Soap, or a solution of soap in alcohol, mixes easily and perfectly with pure water, but is curdled and precipitated in water containing carbonates, sulphates, or muriates.

Var. Distilled Water, (*Aqua destillata*, P. L. & E. *A. Destillata*, P. D. *A. depurata. Holy water.*) The purest kind of artificial water is obtained in quantity, by the distillation of common water, observing to reject the first and last portions that come over. The still employed for this operation should be used for no other purpose; and where great nicety is required, the distillation should be performed in glass or earthenware. Pure distilled water is unaffected by solutions of the caustic and carbonated alkalis, lime, baryta, oxalic acid, acetate of lead, nitrate of silver, or tincture of soap. ⁂ Distilled water should alone be employed in the preparation of infusions, decoctions, extracts, tinctures, saline solutions, &c., and in the various other processes of chemistry and pharmacy where delicacy is required, as its power as a menstruum is not only greater than that of common water, but its purity prevents any secondary decompositions taking place, which frequently vitiates products, in the preparation of which, impure water has been used. When distilled water is not at hand, or in large operations, *clean filtered or clarified rain water* is the only kind that can be successfully substituted.—Rain Water, (*Aqua Pluvialis. A. Pluvia. A. Imbrium.*) This is a very pure kind of natural water, but contains minute quantities of air, carbonic and nitric acids, carbonate of ammonia, &c.—Snow Water, (*Aqua Nivalis. A. ex Nive.*) The purest of all natural waters.—Spring Water. (*Aqua*, P. E. *Aqua Fontana.*) Rain water which has percolated through the earth usually contains mineral impurities. "For pharmaceutical use, spring water must be so far free of saline matter, as not to possess the quality of hardness, or contain above 1-6000th part of solid matter." (P. E.)—River Water, (*Aqua Fluvialis. A. ex Flumine.*) Less pure than good spring water. Thames water contains about 1-3500th part of fixed impurities, chiefly carbonate of lime.—Well Water, (*Pump Water. Aqua Puteana. A. ex Puteo.*) Less pure than either of the preceding. Usually contains a large quantity of carbonate and sulphate of lime. Hence its "*hardness*," and property of curdling soap.—Marsh Water, (*Aqua ex Palude*,) and Lake Water, (*Aqua ex Lacu*,) resemble river water, but contain more organic matter in a state of decomposition, and are hence deemed unwholesome. Sea Water. (*Aqua Marina. A. Maris.*) The characteristic of this variety is its saltness. Its density is about 1·0274, and the average quantity of saline matter which it contains is about 3½ per cent., of which about $\frac{27}{35}$ths are chloride of sodium, and the remainder chiefly chloride of magnesium and sulphate of magnesia.

Purif. Pure water is incapable of putrefaction, but ordinary water contains a small quantity of organic matter in solution, which speedily undergoes decomposition, even in closed vessels. This is especially the case with water kept in wooden casks, or open cisterns, into which leaves and insects may be driven by the wind. Putrescent water is unwholesome as a beverage. Among the simplest methods for purifying foul water are the following:—1. Filtration or agitation with coarsely-powdered fresh-burnt charcoal, either animal or vegetable; but preferably the former. This will not only remove mechanically suspended matter, but also the calcareous and gaseous impurities held in solution.—2. By exposing it freely to the action of the air, by which the organic matter, becoming oxidized and insoluble, speedily subsides. This operation may be easily performed by agitating the water in contact with fresh air, or by forcing air through it by means of bellows.—3. The addition of a little sulphuric acid to water has a like effect; 15 or 20 drops are usually sufficient for a gallon. This addition may be advantageously made to water intended for filtration through charcoal, by which plan at least two-thirds of the latter may be saved. (Lowitz.)—4. An ounce of powdered alum, (dissolved,) well agitated with a hogshead or more of foul water, will precipitate the foul matter in the course of a few hours, when the clear portion may be decanted. When the water is very putrid, a scruple to a drachm may be employed to the gallon, and any alum that may be left in solution may be precipitated by the cautious addition of an equivalent proportion of carbonate of soda.—5. A solution of red sulphate of iron acts in the same way

as alum: a few drops are sufficient for a gallon.—6. Agitation with about the ½ of 1℥ of finely-powdered black oxide of manganese, has a similar effect to the last.—7. The addition of a *little* aqueous chlorine, or chlorine gas, to foul water, cleanses it immediately. This method has the advantage of the water being perfectly freed from any excess of the precipitant by heat.—8. Sea water may be rendered fit for washing by the addition of a solution of carbonate of soda or potash as long as it turns milky. After repose, the clear portion must be decanted. (Dr. Mitchell.)—9. Hard water may be softened in the way last mentioned.

Pres. Water is usually preserved on ship-board in iron tanks, or in casks well charred on the inside. It cannot be safely kept in copper or leaden vessels, and receives a calcareous impregnation by contact with lime, mortar, stucco, or stone containing lime. The addition of about ½ of 1℥ of finely-powdered black oxide of manganese to water, materially promotes its preservation, especially at sea, as the motion of the vessel and consequent agitation of the water increase the points of contact.

WATER, CHALYBEATE. *Prep.* (Ure.) Protosulphate of iron 3 grs.; bicarbonate of potash 61 grs.; cold (rain) water 1 quart; mix and agitate in a corked bottle. This artificial chalybeate water possesses equal tonic powers to that of the springs; but it may be rendered pleasanter by forcing in a little carbonic acid gas.

WATER-COLOR CAKES. These are the ordinary colors that work well in water, made into a stiff and perfectly smooth paste with gum water, or isinglass size, or a mixture of the two, and then compressed in a polished steel mould, and dried.

WATER, FLY. *Prep.* White arsenic 1 dr.; boiling water 1 pint; dissolve, and sweeten with treacle. *Used* to kill flies. *A dangerous method*, and one that should never be adopted where there are children.

WATERPROOF CLOTH. *Prep.* I. (*Hancock's Patent.*) By spreading the liquid juice of the caoutchouc tree upon the inner surface of the goods, and allowing them to dry in the air.

II. (*Potter's Patent.*) By imbuing the cloth on the wrong side with a solution of isinglass, alum, and soap, by means of a brush. When dry, it is brushed on the wrong side against the grain, and then gone over with a brush dipped in water. Impervious to water, but not to air.

III. (*Sievier's Patent.*) By applying first a solution of Indian rubber in oil of turpentine, and afterwards another Indian rubber varnish, rendered very drying by the use of driers. On this, wool or other material of which the fabric is made, cut into proper lengths, is spread, and the whole passed through a press, whereby the surface acquires a nap or pile.

IV. Moisten the cloth on the wrong side, first with a weak solution of isinglass, and when dry, with an infusion of nutgalls.

V. As the last, but substitute a solution of soap for isinglass, and another of alum for galls.

WATERPROOF LIQUID. *Prep.*—1. Indian rubber ¼ oz.; oil of turpentine ¾ pint; put them into a pot, tie it over with bladder, and set it in hot water; when dissolved, add hot "boiled" oil 1 pint.—2. Boiled oil 1 quart; Indian rubber 1 oz.; dissolve by heat.—3. Linseed oil 1 pint; yellow wax and common turpentine, of each 2 oz.; Burgundy pitch 1 oz.; melt together.—4. Linseed oil 1 pint; suet 8 oz.; beeswax 6 oz.; rosin 1 oz.; melt together. All the above are used to render leather boots and shoes waterproof.

WATER, ROSE. *Prep.* Otto ʒiij; rectified spirit (warm) 1 pint; dissolve, add hot water 10 gallons; mix in a 12-gallon carboy, cork, and agitate till cold. This makes the ordinary rose water of the shops. It is better for distillation. (See DISTILLED WATERS.)

WATER, (CORDIAL.) Liqueurs possessing little viscidity. They are prepared in a similar way to the balms, creams, oils, and other cordials of the liqueuriste, but with less sugar. The following is an example of this class of liqueurs:—

WATER OF CEDRAT. Double refined sugar 6 lbs.; boiling rain water 7 quarts; dissolve, add spirit of cedrat 2 quarts; spirit of citron 1 quart; mix well, and filter while hot, as rapidly as possible, through a clean bag into a carboy or bottle; cork down immediately, and in 2 or 3 months bottle. Very fine. (See CORDIALS and LIQUEURS.)

WATERS, (DISTILLED.) *Syn.* AQUA DISTILLATÆ, (P. L.) A. DISTILLATÆ, (P. D.) DISTILLED WATERS, (P. E.) AROMATIC DO. PERFUMED DO. Pure water charged with the odorous and aromatic principles of plants. Distilled waters are mostly employed as vehicles or perfumes. Those intended for medical purposes are commonly prepared by simply distilling the herb or flowers along with water in an ordinary still; a larger quantity of water being employed than it is intended to draw over, for the purpose of preventing empyreuma. The aromatic waters for medical purposes may be prepared extemporaneously, of nearly equal quality to those obtained by distillation, by carefully triturating *a drachm* of any of the essential oils, with an equal quantity of magnesia, and agitating it well with 2 quarts of *warm* distilled water in a corked bottle; or as much of a solution of the essential oil in rectified spirit may be added to the water as it will bear, without becoming milky, the whole being well agitated as before, and when cold filtered, if necessary, through bibulous paper. White sugar may be advantageously substituted for magnesia, as the water is apt to dissolve a little of the latter substance, and is hence rendered unfit to be used as a solvent for metallic salts, especially bichloride of mercury and nitrate of silver. The *dose* of the aromatic or carminative waters, as those of dill, caraway, peppermint, pennyroyal, &c., is a wine-glassful ad libitum.

In the distillation of waters intended for perfumery, the utmost care is requisite to produce a highly fragrant article. The still should be furnished with a high and narrow neck, and the heat of steam, or a salt-water bath, should alone be employed. The first few ounces of the runnings should be rejected, except when spirit is used, and the remainder collected till the proper quantity be obtained, observing that the whole product be mixed together; as distilled waters progressively decrease in strength the longer the process is continued. When a very superior article is desired, the waters may be redistilled by a gentle heat, the first two-thirds only being preserved. The odor of distilled waters is improved by keeping

hem for some months in a cold cellar loosely covered, as they thus lose the herbaceous smell which they frequently possess when recently prepared. When these waters have been carefully prepared, so that none of the liquor in the still has "spirited" over into the condensing worm, they keep well, and are not liable to change; but should the reverse be the case, they frequently become ropy and viscid. The best remedy is to redistil them. Waters which have acquired a burnt smell in the "stilling," lose it by freezing. Distilled waters may be prevented from turning sour by adding a little calcined magnesia to them; and those which have begun to spoil, may be recovered by adding to each pint, a grain each of borax and alum. This doctoring is not, however, to be recommended. A drop of muriate of gold added to these waters shows whether they contain any uncombined essential oil, by forming in that case a fine metallic film on the surface. After distilled waters have acquired their full odor, they should be carefully preserved in well-stopped bottles. Some houses keep a separate still for each of the more delicate perfumed waters, as it is extremely difficult to remove any odor that adheres to the bottom of the still and worm. The best method of cleaning a still is to employ it for the distillation of pure water with the worm-tub empty. The addition of the small quantity of spirit ordered by the colleges in the preparation of their waters, in no way tends to promote their preservation; in fact, I have observed that waters so treated, acetify much sooner than those without spirit. I have prepared scores of hogsheads of rose and elder-flower waters, which have shown no disposition to undergo spontaneous decomposition, without the use of a single drop of spirit.

The following are the quantities of the respective ingredients ordered by the Colleges, for the preparation of one gallon of their distilled waters:—(2 gallons of water are put into the still along with f℥vij of proof spirit, but only *one* gallon is drawn over.)—Dill water, (*Aqua Anethi*, P. L.)—Caraway do., (*A. Carui*, P. L.)—Fennel do., (*A. Fœniculi*, P L.,) bruised seeds lb. iss.—Orange Flower do., (*A. florum aurantii*, P. L.)—Rose do., (*A. Rosæ*, P. L.)—Elderflower do., (*A. Sambuci*, P. L.;) fresh flowers lb. x.—Cinnamon do., (*A. Cinnamomi*, P. L.)—Cassia do., (*A. Cassiæ*, P. E.;) bruised bark lb. iss, or essential oil ʒij.—Orange peel do., (*A. Corticis Aurantii*, P. L. 1746;) fresh peel ℥v.—Castor do., (*A. Castorei*, P. L. 1746;) castor ℥v.—Spearmint do., (*A. Menthæ Viridis*, P. L.)—Peppermint do., (*A. Menthæ Piperitæ*, P. L.)—Pennyroyal do., (*A. Menthæ Pulegii*, P. L.;) fresh herb lb. iv, or dry herb lb. ij, or essential oil ʒij.—Pimento do, (*A. Pimentæ*, P. L.;) berries lb. j, or essential oil ʒij.—Lettuce do., (*A. Lactucæ*, P. Cod.)—Borage do., (*A. Boraginis*, P. Cod.,) &c., &c., fresh leaves lb. xij.—Lavender do., (*A. Lavandulæ*, P. Cod.)—Sage do., (*A. Salviæ*, P. Cod.)—Tansy do., (*A. Tanaceti*, P. Cod.)—Thyme do., (*A. Thymi*, P. Cod.,) &c.; flowering tops lb. vj.—Cherry Laurel do., (*A. Laurocerasi*, P. Cod.)—Peach do., (*A. Persicæ*, P. Cod.,) &c.; fresh leaves lb. xij.—Bitter Almond do., (*A. Amygdalarum Amarum*, P. Cod.;) bitter almond cake, from which the oil has been expressed, lb. v; water q. s.; macerate 24 hours, and distil.—Balm do., (*A. Melissæ*, P. Cod.)—Hyssop do., (*A. Hyssopi*, P. Cod.,) &c., fresh tops lb. xij.—Melilot do., (*A. Meliloti*, P. Cod.)—Origanum do, (*A. Origani*, P. Cod.,) &c., &c.; dried flowers lb. iij.—Angelica do., (*A. Angelicæ*, P. Cod.,) &c.; bruised seed lb. iij.—Valerian do., (*A. Radicis Valerianæ*, P. Cod.)—Cascarilla do., (*A. Corticis Cascarillæ*, P. Cod.)—Clove do., (*A. Caryophilli*, P. Cod.)—Sassafras do., (*A. Ligni Sassafras*, P. Cod.)—Juniper do., (*A. Baccæ Juniperi*, P. Cod.,) &c., of each, bruised, lb. iij.—Cherry-laurel Water, (*A. Lauro-cerasi*, P. E.;) fresh leaves, chopped, lb. j; water 2½ pints; distil 1 pint, add compound spirit of lavender f℥j, agitate, and if milky, filter it. *Dose*. ʒss to ʒj, as a substitute for hydrocyanic acid. It is commonly imitated in trade, by dissolving 75 drops of the oil of bitter almonds in f℥iiss of rectified spirit, and agitating the mixture with 1 gallon of warm distilled water.

⁂ In a similar manner may be made the distilled waters of other aromatic and odorous substances. In general, the druggists draw off 2 gallons or more of water from the above quantities of the herbs, barks, seeds, or flowers; hence the inferior quality of the waters of the shops. They do, however, very well for vehicles. The perfumers, on the contrary, use an excess of flowers, or at least reserve only the first and stronger portion of the water that distils over, the remainder being collected and used for a second distillation of fresh flowers. The most beautiful distilled waters are those prepared in the South of France, and which are imported into England under the French names. Thus, *Eau de Rose*, *Eau de fleurs d'oranges*, &c., are immensely superior to the best English rose or orange-flower water, &c. The water that distils over in the preparation of the essential oils is usually of the strongest and finest class. (See Eaux, Essences, and Vegetables for *distillation*.)

WATERS, EYE. *Syn.* Collyria. *Prep.* 1. Vinegar ℥j; proof spirit or brandy f℥ss; rose or elder-flower water f℥viij; mix. In simple ophthalmia.—2. (Krimer.) Muriatic acid 20 drops; mucilage ʒj; rose water f℥ij. To remove particles of iron or lime from the eye.—3. Wine of opium ʒij; sulphate of zinc ℈j; rose and distilled water, of each f℥iv; astringent and anodyne; in painful ophthalmia.—4. (P. C.) Sulphate of zinc 10 grs.; water f℥iv; dissolve. An excellent astringent water in ophthalmia. It may be made with rose water.—5. (Bates.) Blue vitriol 15 grs.; camphor 4 grs.; boiling water f℥iv. When cold make it up 4 pints, and filter. In purulent ophthalmia.—6 (*Common.*) White vitriol and camphor, of each ʒss; boiling water 1 quart; when cold filter. *Used* in ophthalmia.—7. Opium 10 grs.; boiling water f℥vj; when cold, add solution of acetate of ammonia f℥ij, and filter. In painful ophthalmia.—8. Camphor julep f℥vj; solution of acetate of ammonia and rose water, of each f℥ij; mix. For weak eyes after ophthalmia.—9. (Goulard's.) Solution of diacetate of lead 10 drops; rose or elder-flower water f℥vj; mix. In the inflammatory stage of ophthalmia.—10. Acetate of lead 10 grs.; water ½ pint; as the last.—11. Sulphate of copper 4 grs.; camphor mixture 6 oz.; dissolve. In the purulent ophthalmia of infants.—12. (P. Cod.) Extract of

opium 4 grs.; rose water f ℥iv; dissolve. In painful ophthalmia.

WATERS, (In Perfumery.) The *simple distilled waters* of the perfumer have been already noticed. They may be prepared from any substances which impart their fragrance to water by distillation. The *compound waters* employed as perfumes consist of very pure rectified spirit, holding in solution essential oils, or other odorous matter, and resemble the *esprits, essences, and spirits,* before noticed. They differ from *extraits* in being mostly colorless, or nearly so, and in being generally prepared by distillation, or by the addition of the pure essential oils or essences to carefully rectified and perfectly scentless spirit; whereas, the extraits are mostly and preferably prepared by macerating the flowers, &c. in the spirit, after the manner of making tinctures. *Extraits* are to be preferred to *eaux* and *esprits* as the basis of good perfumery, where the color is not objectionable. The sp. gr. of spirit for these preparations should always be under 0·88, and for the finer qualities should be about 0·838 or 0·840. The following are examples of *compound perfumed waters* :—

Honey Water. *Syn. Sweet-scented Honey Water. Aqua Mellis odorifera. Prep.*—1. Spirit of roses (No. 3) 2 quarts; spirit of jasmin and rectified spirit of wine, of each 1 quart; essence of Portugal 1 oz.; essences of vanilla and musk, of each (No. 3) 4 oz.; flowers of benzoin 1½ drs.; mix, agitate, and add eau de fleurs d'oranges 1 quart. Delightfully fragrant.—2. Honey 3 oz.; essence of bergamot ½ oz.; essence of lemon ¼ oz.; oil of cloves 12 drops; musk 12 grs.; ambergris 6 grs.; rectified spirit 1 gallon; orange-flower and rose water, of each 1 quart; macerate 14 days, with frequent agitation, and filter.—3. (*Colored.*) To the last add hay saffron 20 grs. The above are used as perfumes, and the last two are made into ratafias with sugar. *⁎* *Honey water* for the hair is a different article to the above. It is obtained by the dry distillation of honey, mixed with an equal quantity of clean sand, a gentle heat only being employed. The product is yellowish and acidulous, from the presence of acetic acid. It is used to promote the growth of the hair.

Lavender Water. (See Eau de Lavende.) It may be useful to observe here, that the common *lavender water, double distilled do.,* or *spirits of lavender* of the druggists, is made with spirit at proof, or under; hence its inferior quality to that of the more celebrated perfumers. One ounce of true English oil of lavender is all that will properly combine with one gallon of proof spirit, without injuring the color by rendering it muddy

Millefleur Water. *Syn. Eau de Millefleurs. Prep.* Very pure rectified spirit 9 pints; balsam of Peru (genuine) and essence of cloves, of each 1 oz.; essences of bergamot and musk, of each 2 oz.; essences of neroli and thyme, of each ¼ oz.; eau de fleurs d'oranges 1 quart; mix well. Very fine (See p. 260.)

Eau de Mousseline. *Prep.* Eau de fleurs d'oranges and spirit of clovegilly flower, of each 1 quart; spirit of roses, (No. 3,) spirit of jasmin, (No. 4,) spirit of orange-flowers, (No. 4,) of each 2 quarts; essences of vanilla and musk, of each (No. 3) 2 oz.; sanders wood ½ oz.; mix. Very fine.

WATERS, MINERAL. *Syn.* Aquæ Minerales. Our space will not permit a description of these individually. The following tables, exhibiting their composition, will, however, enable the reader, with a little attention, to produce them artificially :—

I. Tabular View of the Composition of several of the more celebrated Mineral Waters.

From *Brande's Manual of Chemistry.*

One Pint, Wine Measure, contains the following Ingredients:

WATERS	Nitrogen, C.I.	Carbonic Acid, C.I.	Sulphuretted Hydrogen C.I.	Carbonate of Soda, grains.	Carbonate of Magnesia, grs.	Carbonate of Lime, grains.	Sulphate of Soda, grains.	Sulphate of Magnesia, grains.	Sulphate of Lime, grains.	Muriate of Soda, grains.	Muriate of Magnesia, grains.	Muriate of Lime.	Oxide of Iron.	Silica.	Temperature.	Total of Saline Contents.	AUTHORITY.
CARBONATED.																	
Seltzer	...	17·	...	4·	5·	3·	...	...	...	17·	...	...	...	...	Cold	29·	Bergman.
Pyrmont	...	26·	...	...	10·	4·5	...	5·5	8·5	1·5	...	...	0·6	...	do.	30·6	Ditto.
Spa	...	13·	...	1·5	4·5	1·5	...	...	...	0·2	...	...	0·6	...	do.	8·3	Ditto.
Carlsbad	...	5·	...	5·	...	1·5	8·5	...	...	4·5	...	...	a trace	0·3	165°	19·8	Klaproth.
Pouges	...	30·	...	10·	1·2	12·	...	...	...	2·2	...	...	2·5	0·5	Cold	28·4	Hassenfratz.
Saint Parize	...	22·	...	...	0·5	11·5	...	...	13·	...	...	...	...	...	do.	25·	Ditto.
SULPHUROUS.																	
Harrowgate	0·8	1·	2·3	...	0·7	2·5	...	1·3	...	77·	11·	1·5	...	...	do.	94·	Garnet.
Moffat	0·5	0·6	1·2	...	...	...	...	...	...	4·5	...	...	...	...	do.	4·5	Ditto.
Aix-la-Chapelle	...	...	5·5	12·	...	4·2	...	...	...	5·	...	...	...	...	143°	21·2	Bergman.
Cheltenham Sulph. Spring	...	...	1·5	...	...	...	23·5	5·	1·2	35·	...	...	0·3	...	Cold	65·	Parkes & Brande.
SALINE.																	
Seidlitz	...	...	...	...	2·5	0·8	...	180·	5·	...	4·5	...	...	...	do.	192·8	Bergman.
Cheltenham Pure Saline	...	...	...	...	...	...	15·	11·	4·5	50·	...	...	...	...	do.	80·5	Parkes & Brande.
Bristol	...	3·5	...	...	...	1·5	1·5	...	1·5	0·5	1·	...	...	...	74°	6·	Carrick.
Buxton	0·2	...	...	...	...	1·3	...	...	0·3	0·2	...	...	0·03	...	82°	1·83	Pearson.
Bath	...	1·2	...	...	...	0·8	1·5	...	9·	3·3	...	...	a trace	0·2	116°	14·6	Phillips.
Scarborough	...	...	...	...	...	a trace	20·	...	9·	...	...	...	ditto	...	Cold	2·9	Saunders.
Barège	...	...	uncertain	2·5	...	ditto	...	...	a trace	0·5	...	...	...	...	190°	3·	Ditto.
Plombières	...	...	...	2·5	...	0·3	2·3	...	...	1·5	...	...	...	0·3	?	66·	Vauquelin.
Kilburn	...	3·5	8·5?	...	0·5	1·	12·	37·	5·5	2·5	5·5	0·2	a trace	...	Cold	64·2	Schmeisser.
Leamington New Bath	0·4	a trace	a trace	...	...	...	19·	...	14·	53·	1·5	...	0·8	...	do.	88·3	Lambe.
Leamington Old Bath	0.3	...	ditto	...	...	...	7·5	7·	18·	41·	...	...	...	...	do.	73 5	Ditto.
CHALYBEATE.																	
Tunbridge	0·59	1·	{trace of oxygen}	...	...	0·03	...	...	0·17	0·30	0·03	0·05	0·28	...	do.	0·56	Scudamore.
Cheltenham Chalybeate	...	2·5	...	0·5	...	...	22·7	6·	2·5	41·3	...	...	0·8	...	do.	73·8	Parkes & Brande.
Brighton	...	2·2	...	...	...	...	...	...	4·	3·	0·75	...	1·4	0·14	do.	9·29	Marcet.

II. Table of Analysis of the principal mineral Waters of Germany.

From *Brande's Manual.*

Dry Ingredients found in 16 oz. of Water, in Grains.	Carlsbad.	Ems.	Marienbad. Kreutzbr.	Auschowitz. Ferdinands-brunnen.	Eger. Franzenbr.	Pyrmont.	Spa.	Geiln[illegible]	Selters.	Seid-schütz.	Pullna.
Carbonate of Soda	9·695	10·750	8·26	6·197	5·00	...	0·7375	6·6210	6·155	...	...
Sulphate of Soda	10·689	...	39 72	22·544	25·50	2·14566	0·0375	0·0420	...	23·4960	123·8
Muriate of Soda	7·975	7·634	12 45	8·996	7·96	...	0·44949	0·5430	17·292	...	...
Sulphate of Potash	...	0·540	0·93	...	0·93	0·04194	0·07909	0·2872	0·397	4·8940	4·8
Muriate of Potash	...	0·045	...	...	...	...	...	...	0 358	...	...
Carbonate of Lime	2·37	1·1407	4·1300	4·016	1·847	5·96824	0·9850	2·9705	2·1870	6 8060	0·77
Sulphate of Lime	...	...	...	...	...	7·23132	...	...	...	1·5050	2·6
Subphosphate of Lime	0·0017	...	...	...	0·014	...	0·01366	...	...	0·0156	0·0035
Fluate of Lime	0·024	0·00193	...	...	..	...	...	...	0·0018	...	...
Carbonate of Magnesia	1·369	0·7887	3·0560	2·4	0·600	0·32352	1·12278	2·1709	1·3780	1·0980	6·406
Sulphate of Magnesia	...	...	...	...	...	2·69752	...	...	...	83 1380	93·086
Muriate of Magnesia	...	...	...	...	...	1·19664	...	...	...	1 6300	19·666
Nitrate of Magnesia	...	...	...	...	...	...	...	...	...	7·9070	...
Alumina	...	...	0·0075	...	...	...	...	0·0247	...	..	...
Subphosphate of Alum	0·0024	0·0018	...	...	...	0·01478	0·00851	...	0·0027	0 0117	..
Carbonate of Strontia	0·007	0 0107	...	...	...	...	...	...	0·0192	...	...
Sulphate of Strontia	...	..	...	...	...	0·02063	...	...	...	0·0463	...
Carbonate of Barytes	..	0·0029	...	...	...	...	...	...	0 0019	..	...
Silica	0·577	0·4139	0·8800	0·669	0·568	0·49689	0·4985	0·2695	0·302	0·1200	0·176
Carbonate of Iron	0 0278	0·026	0·1760	0·4	0 350	0 42846	0 3751	...	...	0·0127	...
Carbonate of Manganese	0 006	0 0037	0 0065	0·002	0·006	0 04852	0 0519	...	...	0·0042	...
Total	41·9239	21 35932	69·616	45·314	42 775	20·55412	4·35903	12·9288	28·0946	130 6845	251·3075
Carbonic Acid Gas in 100 cubic inches	58	51	125	149·56	154	160	136	163·3	130	6·4	6·9
Temperature (F)	Sprud. 165° Neub. 138 Muhl. 128 Ther. 122	Kess. 117° Kran. 84	53°	49°	53°	56°	50°	51°	58°	58°	58°
Analyzed by	Berzelius.	Struve.	Struve.	[illegible]	Struve.	Struve	Struve	Struve	Struve	Struve.	Struve

III. Analysis of Sea Water, English Channel, by Schweitzer.

Pure water	964·74372 grs.
Chloride of sodium	27·05948 "
" potassium	0·76552 "
" magnesium	3·66658 "
Bromide of magnesium	0·02929 "
Sulphate of lime	1·40662 "
Sulphate of magnesia	2·29578 "
Carbonate of lime	0·03301 "
	1000·00000 grs.

*** In addition to the above, it may be remarked that traces of *iodine* have been found in the water of Cheltenham, (old well,) traces of *bromine* in the water of Epsom, and traces of both *bromine* and *iodine* in that of Leamington, (royal pump.) *Manganese* has been found in the waters of Tunbridge, Carlsbad, Spa, Pyrmont, Marienbad, Saidschütz, &c. Traces of *phosphoric* and *fluoric* acids have also been found in some mineral waters. It is the opinion of many high authorities, that the medicinal virtues of these waters depend more on the minute quantities of the above substances, than on their more abundant saline ingredients.—C.

WAX. *Syn.* Cire, (*Fr.*) Wachs, (*Ger.*) Cera, (*Lat.*) The substance which forms the cells of bees. Pure beeswax (*yellow wax, cera flava*) has a pleasant ceraceous odor, a pale yellowish brown color, and the sp. gr. 0·960 to 0·965. It is frequently adulterated with farina, rosin, and mutton suet or stearine. The *first* may be detected by oil of turpentine, which dissolves only the wax,—the *second*, by its solubility in cold alcohol, and by its terebinthinate taste,—the *last two*, even when forming less than 2§ of the wax, may be detected by its affording sebacic acid by distillation. When greasy matter is present in any considerable quantity, it *may* also be detected by the suspected sample having an *unctuous* feel, and a disagreeable taste.

WAX, BEES' (FACTITIOUS.) *Syn.* Cera flava factitia. *Prep.*—1. Yellow rosin 16 lbs.; hard mutton suet or stearine 8 lbs.; palm oil 2½ lbs.; melt together.—2. As last, but substitute turmeric 1 lb. for the palm oil.—3. Best annotto oz. or q. s.; water 1 gallon; boil till dissolved, add hard mutton suet or stearine 35 lbs.; yellow rosin 70 lbs.; boil with constant agitation till perfectly mixed and of a proper color, and as soon as it begins to thicken, pour it out into basins to *cool*. When cold rub each cake over with a little potato starch. *Used* instead of wax in ointments by farriers.

WAX, REFINED. Crude wax, especially that imported, is generally loaded with dirt, bees, and other foreign matter. To free it from these substances, it undergoes the operation of refining. This is done by melting the wax along with about 3§ of water in a bright copper boiler, preferably heated by steam, and after the whole is perfectly liquid, and has boiled for a few minutes, withdrawing the heat, and sprinkling over its surface a *little* oil of vitriol, in the proportion of about 3 or 4 oz. (fluid) to every cwt. of wax. This operation should be conducted with great care and circumspection; as, if done carelessly, the melted wax will froth up, and boil over the sides of the pan. The acid should also be well scattered over the *whole surface*. The melted wax is next covered over, and left for some hours to settle, or till it becomes sufficiently cool to be drawn off into the moulds. It is then very gently skimmed with a (hot) ladle, and bailed or decanted into basins, where it is left to cool. Great care must be taken not to disturb the sediment. When no more clear wax can be drawn off, the remainder in the melting pan is allowed to cool, and the cake or "*foot*," as it is called, is taken out, and the impurities (mostly bees) scraped from its under surface. The remaining portion is usually reserved for a second operation, but if required, may be at once melted, and strained through canvass into a mould.—Much of the foreign wax has a pale dirty color, which renders it, no matter however pure, objectionable to the retail purchaser. Such wax undergoes the operation of coloring. This is done as follows:—A small quantity of the best roll annotto, cut into slices, (¼ lb. more or less, to wax 1 cwt., depending on the paleness of the latter,) is put into a clean boiler with about a gallon of water, and boiled for some time, or till it is perfectly dissolved, when a few ladlefuls of the melted wax are added, and the boiling continued till the wax has taken up all the color, or till the water is mostly evaporated. The portion of wax thus treated has now a deep orange color, and is added in quantity as required to the remainder of the melted wax in the larger boiler, till the proper shade of color is produced when cold, observing to well mix the whole, and to cool a little now and then to ascertain when enough has been added. The copper must be then brought to a boil, and treated with vitriol, &c., as before.—*Another method* is to add palm oil (bright) to the wax till it gets sufficient color; but this plan is objectionable from the quantity required for the purpose being often so large as to injure the quality of the wax; besides which the color produced is inferior, and less transparent and permanent. *** The great art in the above process is to produce a wax which shall at once be "*bright*," or semitranslucent in thin pieces, and *good colored*. The former is best ensured by allowing the melted mass to settle well, and by carefully skimming and decanting the clear portion without disturbing the sediment. It should also not be poured into the moulds too warm, as, in that case, it is apt to "*separate*," and the resulting cakes to be "*streaky*," or of different shades of color. It should also be allowed to cool *very slowly*. When cooled *rapidly*, especially if a current of air fall upon its surface, it is apt to crack, and form cakes full of fissures. Some persons who are very nice about their wax, have the cakes polished with a stiff brush when quite cold and hard. It is necessary to have the "jacks" or cans, ladles, and skimmers used in the above process kept pretty hot, as without this precaution the wax cools, and accumulates upon them in such quantity as to render them inconvenient, and *often* quite useless, without being constantly scraped out.

Another method of refining crude wax, and which produces a very bright article, is to melt it with about 1 per cent. of concentrated nitric acid, in a large earthen or stoneware vessel, heated by

steam or a salt-water bath, and to continue the boiling till nitrous fumes cease to be evolved, after which the whole is allowed to settle, and treated as before.

WAX, SEALING. *Syn.* Cire a Cacheter, (*Fr.*) Siegellack, (*Ger.*) *Prep.* I. (*Red.*) *a.* Shellac (very pale) 4 oz.; cautiously melt in a bright copper pan over a clear charcoal fire, and when fused add Venice turpentine 1¼ oz.; mix, and further add vermilion 3 oz.; remove the pan from the fire, cool a little, weigh it into pieces, and roll them into circular sticks on a warm marble slab by means of a polished wooden block; or it may be poured into moulds while in a state of fusion. Some persons polish the sticks with a rag till quite cold. Fine.—*b.* Shellac 3 lbs.; Venice turpentine 19 oz.; finest cinnabar 2 lbs.; mix as before. Fine.—*c.* As the last, but use ½ less vermilion.—*d.* Rosin 4 lbs.; shellac 2 lbs.; Venice turpentine and red lead, of each 1½ lb.; as before. Common.

II. (*Black.*) *a.* Shellac 60 parts; very fine ivory-black, reduced to an impalpable powder, 30 parts; Venice turpentine 20 parts. Fine.—*b.* As the last, but using lampblack for ivory-black. Fine.—*c.* Rosin 6 lbs.; shellac and Venice turpentine, of each 2 lbs.; lampblack q. s. Inferior.

III. (*Bottle Wax.*)—*a.* (*Black.*) Black rosin 6½ lbs.; beeswax ½ lb.; finely-powdered ivory-black 1½ lb.; melt together.—*b.* (*Red.*) As the last, but substitute Venetian red or red lead for ivory-black.

IV. (*French.*) Shellac (pale) 3 lbs.; Venice turpentine 1¼ lb.; vermilion 2¼ lbs.; divide into sticks 12, 24, 36, or 40 to the lb. Fine.

V. (*Gold.*) By stirring gold-colored mica spangles or talc, or aurum musivum into the melted resins when they begin to cool. Fine.

VI. (*Marbled.*) By mixing 2 or 3 different colored kinds just as they begin to grow solid.

VII. (*Soft.*)—1. (*Red.*) Beeswax 8 parts; olive oil 5 parts; melt, and add Venice turpentine 15 parts; red lead to color.—2. (*Green.*) As the last, but substitute powdered verdigris for red lead. Both are used for sealing certain official documents kept in tin boxes; also as a cement.

*** All the above forms for "*fine*" wax produce "*superfine*," by employing the best qualities of the ingredients; and "*extra-superfine*," or "*scented*," by adding 1⅝ of balsam of Peru or liquid storax to the ingredients when considerably cooled. The variegated and fancy-colored kinds are commonly scented with a little essence of musk or ambergris, or any of the more fragrant essential oils. The addition of a *little* camphor, or spirit of wine, makes sealing-wax burn easier. Sealing-wax adulterated with rosin, or which contains too much turpentine, runs into thin drops at the flame of a candle.

WAX, WHITE. *Syn.* Bleached Wax. Block white Wax. Cera alba in massis. From pure beeswax, by exposing it in thin flakes to the action of the sun, wind, and rain, frequently changing the surface thus exposed, by remelting it, and reducing it again to thin flakes. *Used* in making candles, and in white ointments, for the sake of its color. Virgins' Wax, (*Cake white wax, cera alba in offis.*) The last made into round flat cakes.

WEIGHT. The measure of the force by which any body, or any given portion of a substance, gravitates towards the earth. The estimation of the weight of bodies is called *weighing*, and consists in the comparison of the thing to be weighed with some conventional standard. This standard may be determined by the constant ratio which exists between the volume and the weight, or gravitating power of the same substances when placed in precisely the same physical condition; hence for the *primary* creation of a standard weight, reference must be had to the measure of the volume of some substance, as a cubic foot or inch of pure water or mercury, the weight of which is constant at the same temperature, and under the same atmospheric pressure. The method of estimating the weight of bodies, without reference to their volume, or to a standard which is already known, is difficult and uncertain. In fact, it is impossible to communicate merely by oral description, without reference to some sensible object, a proper idea of a pound weight, or a foot-rule; since the mind requires some known measure of volume or gravitating power, for the purpose of comparison. But man is not directly supplied by nature with any constant standard of weight or volume, by which he can accurately determine that of other bodies. The original standard of small weight was the grains or corns of wheat, and of measure, the foot, cubit, span, pace, &c., derived from the human body; but since the size of grains of wheat, and the linear surface of the human body, varies under different circumstances, and in different individuals, however carefully the specimens may be selected with a view to an average, it is very evident that such bodies can never furnish permanent and accurate standards of comparison. It may be fairly stated, that nature furnishes no standard of weight, at the same time invariable and accessible to all mankind, and that without reference to some determined and constant measure of volume, no such standard can be created. But the elements of such a standard of measure are furnished by the aid of natural philosophy, and a refined knowledge of the arts. The form and magnitude of the earth are presumed to remain the same in all ages, and hence a determined portion of its circumference, as 1-360th part, or a degree, will represent an unalterable standard, fit for the purposes of metrology. The force of gravitation at the earth's surface is also constant under the same parallels of latitude and at the same elevation above the level of the sea, and hence the length of a second's pendulum is invariable at any given place, under precisely similar circumstances. This furnishes a second element for the determination of a lineal standard, which [illegible] similar standards of measure, both o[illegible] and volume. A measure of bulk or volume being determined, it is easy to estimate weight, or the gravitating power of any substance, by reference to such a standard. As soon as a unit of weight or measure has been agreed on, and a model weight or measure formed, the latter becomes the standard, and others may of course be readily formed by mere comparison; but when these standards, or their representatives, are lost, recourse must be again had to science and calculation. The relation between the weight and volume of a body, compared to a given st[illegible]

ard taken as unity, constitutes its specific gravity.

For the purpose of WEIGHING, a *balance* or *lever* is required, which, when accurately suspended in a state of equilibrium, will be like affected by like weights applied to either extremity. The manufacture of these instruments requires great skill and experience. A balance, made by Ramsden, turning on points instead of edges, was sensibly affected by the 1-1600th of a grain, when loaded with 4 or 5 ounces. This is 1-384,000th part of the weight; so that this beam would determine the weight of any substance to 5 places of decimals, besides a sixth figure, which might be estimated. (Phil. Trans., vol. 75.) A balance made by the same artist for the Royal Society, was capable of weighing 10 lbs., and yet turned with the 1-100th of a grain, which is only the 1-7,000,000th part of the weight. A balance with *unequal arms* will weigh as accurately as another, of the same workmanship, with *equal arms*, provided the substance weighed be removed, and standard weights placed in the same scale till the equilibrium be again restored, when the weights so employed, being exactly in the same condition as the substance previously occupying the scale, will of course indicate its proper weight. A knowledge of this fact is useful, as it enables any one to weigh *correctly* with *unequal scales*, or with any suspended lever.

SMALL WEIGHTS may be made of thin leaf-brass. Jeweller's foil is a good material for weights below 1-10th of a grain, as low as to 1-100th of a grain; and all lower quantities may be either estimated by the position of the index, or shown by actually counting rings of wire, the value of which has been determined. The readiest way to subdivide small weights, consists in weighing a certain quantity of small wire, and afterward cutting it into such parts, by measure, as are desired; or the wire may be wrapped close round two pins, and then cut asunder with a knife. By this means it will be divided into a great number of equal lengths, or small rings. The wire ought to be so thin, that one of these rings may barely produce a sensible effect on the beam.

The following TABLES represent the values and relative proportions of the principal Weights employed in Commerce and the Arts.

I. ENGLISH WEIGHTS.

1. *Imperial Avoirdupois Weight.*

Grains, (Troy.)	Drs. drachms.	Oz. ounces.	Lbs. pounds.	Qrs. quarters.	Cwt. hundred weight.	Ton.	Equiv. in French grammes.
27·34	1	0·0625	0·0039	0	0	0	1·7705
437·50	16	1·	0·0625	0	0	0	28·328
7000	256	16·	1·	0	0	0	453.25
0	7168	448·	28·	1	0·25	0	
0	28672	1792·	112·	4	1·	0·05	
0	573440	35840·	2240·	80	20·	1·	

*** The *standard* in avoirdupois weight is the same as in troy weight. The avoirdupois drachm is now never used except in weighing silk; whenever a drachm is mentioned in books, the troy, or apothecaries' drachm, is intended. The *stone* of butchers' meat is 8 lbs., and of other commodities 14 lbs., in London.

2. *Imperial Troy Weight.*

Grs. grains.	Dwts. pennyweights.	Oz. ounce.	Lb. pound.
24	1		
480	20	1	
5760	240	12	1

*** The *standard* of the above measure is 1 cubic inch of distilled water, at 62° F., and 30 inches of the barometer, which weighs 252·458 troy grains.

The *carat* used in weighing diamonds is 3⅕ grains, (nearly.) Troy weight is used in weighing gold, silver, jewellery, &c., and in philosophical experiments.

3. *Apothecaries' Weight.*

Gr. grains, (troy.)	℈ scruples.	ʒ drachms.	℥ ounces.	Lb.* pounds.	Equiv. in French grammes.
1	0·05	0·01666	0·002083	0·0001736	0·06475
20	1	0·3333	0·0416	0·003472	1·295
60	3	1·	0·1250	0·0104166	3·885
480	24	8·	1·	0·0833333	31·08
5760	288	96·	12·	1·	372·96.

II. FRENCH WEIGHTS.

1. *Metrical or Decimal Weights.*

Names.	Equiv. in grammes.	Equiv. in troy grains.	Equiv. in avoirdupois weight.
			lbs. oz. grs.
Millegramme	·001	·0154	
Centigramme	·01	·1543	
Decigramme	·1	1·5434	
Gramme	1·	15·434	
Decagramme	10·	154·3402	0¼ 45·
Hectogramme	100·	1543·4023	3½ 12·152
Kilogramme, or Kilo	1000·	15434·0234	2 3¼ 12·173
Myriagramme	10000·	154340·2344	22 0¾ 12·

*** The standard unit in the above table is the gramme. A metrical *quintal* is 10 myriagrammes. A *millier* is 1000 kilos.

* As this abbreviation is used to represent both the avoirdupois, and troy or apothecaries' pound, it is necessary to observe, that the *former* is indicated when this sign is *preceded* by *Arabic figures*; and the *latter*, when it is followed by Roman numerals. It was also formerly used along with Roman numerals, to represent the wine pint.

2. *Binary Weights.* (Système usuel.)

French grain.	Scrupule.	Gros.	Once.	Livre.	Kilogramme.	Equiv. in grammes.	Round No. of the codex in grammes.	Equiv. in avoirdupois weight.
								lbs. oz. grs.
1	0	0	0	0	0	·0542	·05	0·837
24	1	0	0	0	0	1·30	1·30	20·1
72	3	1	0	0	0	3·906	4·	60·284
576	24	8	1	0	0	31·25	32·	1 45·
9216	384	128	16	1	0	500·	500·	1 1¼ 61·
18432	768	256	32	2	1	1000·	1000·	2 3¼ 13·

*** The old French grain is equal to 0·820 of an imperial troy grain; hence, 1 troy grain is equal to 1·21 old French grains. The gros, once, and other multiples of the grain, are of course proportionate. The new French grain (of 1812) is equal to 0·0542 gramme, or 0·8365228 gr. troy. It is said, in some works, to be equal to 0·878 gr. troy; or, in round numbers, 0·9, but this is much too high.

III. Continental Medicinal Weights in Troy Grains.

From Dr. Christison's Dispensatory.

Country.	Pounds.	Ounces.	Drachms.	Scruples consisting of 24 med. gr.	Scruples consisting of 20 med. gr.	Grains.
French	5670·5	470·50	59·10	19·7	—	0·820
Spanish	5326·3	443·49	55·14	18·47	—	0·769
Tuscan	5240·3	436·67	54·58	18·19	—	0·758
Roman	5235·0	436·25	54·58	18·17	—	0·757
Austrian	6495·1	541·25	67·65	—	22·5	1·127
German	5524·8	460·40	57·55	—	19·18	0·960
Russian	5524·8	460·40	57·55	—	19·18	0·960
Prussian	5415·1	451·26	56·40	—	18·80	0·940
Dutch	5695·8	474·64	59·33	—	19·78	0·988
Belgian	5695·8	474·64	59·33	—	19·78	0·988
Swedish	5500·2	458·34	57·29	—	19·09	0·954
Piedmontese	4744·7	395·39	49·45	—	16·48	0·824
Venetian	4661·4	388·45	48·55	—	16·18	0·809

WELSH RAREBIT. *Prep.* Cut slices of bread, toast and butter them; then cover them with slices of rich cheese, spread a little mustard over the cheese, and put the bread in a cheese-toaster before the fire. Serve it up very hot.

WELD. *Syn.* Woald. Vouede, (*Fr.*) Reseda luteola, (*Lin.*) An herbaceous annual employed by the dyers. A decoction of the stems and leaves gives a rich yellow to goods mordanted with alum, tartar, or muriate of tin. The yellow coloring principle may be obtained in beautiful, transparent yellow needles by sublimation. (See Luteoline.)

WHEAT. The quality of this grain may be ascertained in the way directed for wheat flour, p. 317.

WHEY. *Syn.* Petit Lait, (*Fr.*) Molken, (*Ger.*) Serum Lactis, (*Lat.*) The liquid portion of milk after the curd has been separated. It consists chiefly of sugar of milk.—A pound of milk, mixed with a tablespoonful of proof spirit allowed to become sour, and the whey filtered from the sediment, yields, in the course of a few weeks, a good vinegar (*whey vinegar*) free from lactic acid. (Scheele.) Skimmed milk may be used.

WHISKEY. (From *Usquebaugh*, the Irish name originally applied to it.) Dilute alcohol obtained from the fermented wort of malt or grain. That from the former is the most esteemed. The inferior qualities of this spirit are prepared from barley, oats, or rye, a small portion only of which is malted; or from potatoes mashed with a portion of barley malt, the resulting wash being carelessly fermented and distilled, and purposely suffered to burn, to impart the peculiar empyreumatic or smoky flavor so much relished by the lower orders of whiskey drinkers. The malt whiskey (sold as such) of the principal Scotch and Irish distillers, is fully equal in quality to London gin, from which it merely differs in flavor. The peculiar flavor of *Scotch whiskey* may be nicely imitated by adding a *few* drops of pure creosote to 2 or 3 gallons of good London gin; and the imitation will be still more perfect if the liquor be kept for some months before drinking it.

WHITE COPPER. (See German Silver.)

WHITE PIGMENTS.—Alum White (*Baume's.*) Powdered Roman alum 2 lbs.; honey 1 lb.; mix, dry, powder, calcine in a shallow dish to whiteness, cool, wash, and dry. A beautiful and permanent white both in oil and water.—Derbyshire White. Cawk, heavy spar, or native sulphate of barytes.—Flake White. The finer kinds of white lead are so called.—White Lead. (*Fine White. Carbonate of Lead. Subcarbonate of do. Ceruse. Cerussa. Magistery of lead. Plumbi Carbonas*, P. L.) Made by suspending rolls of thin sheet-lead over malt vinegar, or pyroligneous acid, in close vessels, the evaporation from the acid being kept up by the vessels being placed in a heap of dung, or a steam-bath. Commercial carbonate of lead is never quite pure, being commonly adulterated with sulphate of baryta, (*heavy spar*,) and sometimes with chalk. The *former* may be detected by its insolubility in dilute nitric acid, and the *latter* by the nitric solution yielding a white precipitate with oxalic or sulphuric acid, or oxalate of ammonia, after having been treated with sulphureted hydrogen, or a hydrosulphuret, to throw down the lead. "Pure carbonate of lead does not lose weight at a temperature of 212°; 68 grs. are entirely dissolved in 150 minims of acetic acid, diluted with f ℥j of distilled water; and the solution is *not entirely* precipitated by a solution of 60 grs. of phosphate of soda." (P. E.) The solution in nitric acid should not yield a precipitate when treated with a solution of sulphate of soda. *Used* as a superior white paint, and in medicine, externally, as an astringent, refrigerant, and desiccant.—French White Lead. (*Blanc de Plomb.*) Litharge dissolved in dilute acetic acid, and the carbonate of lead thrown down by a current of carbonic acid gas. Does not cover well.—Venetian White Lead, (*Cerussa Veneta.*) Flake white, or pure white lead and cawk, equal

parts.—HAMBURGH WHITE LEAD. Flake white 1 cwt.; cawk 2 cwt.—BEST DUTCH WHITE LEAD. Flake white 1 cwt.; cawk 3 cwt.—DUTCH WHITE LEAD. Flake white 1 cwt.; cawk 7 cwt. The last four are commonly substituted in trade for genuine white lead.—ENGLISH WHITE LEAD. Flake white lowered with chalk. Covers badly, and color inferior to the preceding.—GRACE'S WHITE LEAD. Made from lead, with the refuse water of the starch-makers, soured brewer's grains, &c.—WHITE PRECIPITATE OF LEAD. (*Sulphate of Lead.*) An acetic or nitric solution of litharge, precipitated by adding dilute sulphuric acid, and the white powder washed and dried. The clear liquid decanted from the precipitate is poured on fresh litharge, when a second solution takes place; and this may be repeated for any number of times. *Used* in miniature painting, being a beautiful and durable white.—NOTTINGHAM WHITE. White lead made with alegar.—NEWCASTLE WHITE. White lead made with molasses vinegar.—MINERAL WHITE. A nitric or acetic solution of litharge, precipitated by carbonate of soda.—WILKINSON'S WHITE. Litharge ground with sea-water till it ceases to whiten, and then washed and dried.—PERMANENT WHITE. Artificial sulphate of baryta, prepared by precipitating the muriate by diluted sulphuric acid, or a solution of glauber salts. A good fast white. *Used* to mark jars and bottles for containing acids or alkalis, as it is affected by very few substances.—PEARL WHITE, (*Fard's Spanish White.*) Trisnitrate of bismuth.—SPANISH WHITE. (*Blanc d'Espagne. Blanc de Troyes.*) The softest and purest white chalk, elutriated, made into balls, and well dried. *Used* as a cheap white paint.—WHITING. The same as prepared chalk, but prepared more carelessly.

WHITES, SHARP. *Prep.* 1. Wheat flour and powdered alum, equal parts, ground together.—2. (*Stuff. Baker's stuff.*) Alum ground to the coarseness of common salt 1 lb.; common salt 3 lbs.; mix. Both the above are used by bakers for the purpose of introducing alum into their bread under a disguise.

WINDOWS, SASH. These may be kept up without sash-lines and pulleys, by means of cork, in the simplest manner, and with scarcely any expense. Bore three or four holes in the sides of the sash, into which insert common bottle corks, projecting about the sixteenth part of an inch. These will press against the window-frames, along the usual groove, and by their elasticity support the sash at any height which may be required.

WINDOWS. (*Prismatic Diamond Crystals for.*) Mix a hot solution of sulphate of magnesia, with a clear solution of gum arabic, and lay it on hot. For a margin, or for figures, wipe off the part you wish to remain clear with a wet towel The effect is very pretty.

I. TABLE of the Quantity of ALCOHOL in WINE. By Dr. CHRISTISON.

Names, &c.		Alcohol of 0·7939 per cent. by volume.	Proof spirit per cent. by volume.
PORT	Weakest	14·97	30·56
	Mean of 7 samples	16·20	33·91
	Strongest	17·10	37·27
	White	14·97	31·31
SHERRY	Weakest	13·98	30·84
	Mean of 13 wines, excluding those very long kept in cask	15·37	33·59
	Strongest	16·17	35·12
	Mean of 9 wines long kept in cask in the East Indies	14·72	32·30
	Madre da Xeres	16·90	37·06
MADEIRA	Long kept in cask in the East Indies — Strongest	16·90	36·81
	Long kept in cask in the East Indies — Weakest	14·09	30·86
TENERIFFE long in cask at Calcutta		13·84	30·21
CERCIAL		15·45	33·65
LISBON (dry)		16·14	34·71
SHIRAZ		12·95	28·30
AMONTILLADO		12·63	27·60
CLARET. A first growth of 1811		7·72	16·95
CHATEAU-LATOUR. Do. 1825		7·78	17·06
ROSAN. Second growth 1825		7·61	16·74
ORDINARY CLARET. (Vin Ordinaire)		8·99	18·96
RIVESALTES		9·31	22·35
MALMSEY		12·86	28·37
RÜDESHEIMER. 1st quality		8·40	18·44
" Inferior		6·90	15·19
HAMBACHER. Superior quality		7·35	16·15

II. QUANTITY of ALCOHOL (sp. gr. 0·825* at 60° F.) in 100 parts of Wine by volume.

Names of Wine.	Alcoholic Content.	Authority.
Alba Flora	17·26	Brande
Barsac	13·86	do.
Bucellas	18·49	do.
Burgundy (average)	14·57	do.
Ditto	12·16	Prout.
Calcavella (average)	18·65	Brande.
Cape Madeira (do.)	20·51	do.
Cape Muschat	18·25	do.
Champagne (average)	12·61	do.
Ditto	12·20	Fontenelle.
Claret (average)	15·10	Brande.
Colares	19·75	do.
Constantia (White)	19·75	do.
Ditto (Red)	18·92	do.
Ditto (average)	14·50	Prout.
Côte Rôtie	12·32	Brande.
Currant	20·55	do.
Elder	8·79	do.
Frontignac (Rivesalte)	12·79	do.
Gooseberry	11·84	do.
Grape (English)	18·11	do.
Hermitage (Red)	12·32	do.
Ditto (White)	17·43	do.
Hock (average)	12·08	do.
Lachryma Christi	19·70	do.
Lisbon	18·94	do.
Lissa (average)	25·41	do.
Ditto (do.)	15·90	Prout.
Lunel	15·52	Brande.
Madeira (average)	22·27	do.
Ditto (do.)	21·20	Prout.
Malaga	17·26	Brande.
Ditto	18·94	do.
Malmsey Madeira	16·40	do.
Marsala (average)	25·09	do.
Ditto (do.)	18·40	Prout.
Nice	14·63	Brande.
Orange (average)	11·26	do.
Port (do.)	20·64	Prout.
Ditto (do.)	22·96	Brande.
Raisin (do.)	25·41	do.
Ditto (do.)	15·90	Prout.
Red Madeira (do.)	20·35	Brande.
Roussillon (do.)	18·13	do.
Sauterne	14·22	do.
Sheraaz	15·52	do.
Sherry (average)	19·17	do.
Ditto (do.)	23·80	Prout.
Syracuse	20·00	do.
Ditto	15·28	Brande.
Teneriffe	19·79	do.
Tent	13·30	do.
Tokay	9·88	do.
Vidonia	19·25	do.
Vin de Grave	13·94	do.
Zante	17·05	do.

WINE. *Syn.* VIN, (*Fr.*) WEIN, (*Gr.*) WYN, (*Dut.*) WIN, (*Swed.*) VINO, (*Ital.* and *Span.*) VINUM, (*Lat.*) The fermented juice of the grape. The general characters and qualities of wine are principally influenced by climate, soil, and aspect, the nature and maturity of the grape, and the method of conducting the fermentation. Want of space will compel us to confine our remarks to the properties, uses, and management of grape-juice after it has passed through the stage of fermentation, or, in reality, become *Wine*. Some observations connected with this subject will be found in the articles FERMENTATION and MANURES.

OFFICINAL WINE. The only wine ordered by the British colleges is sherry, (*Vinum Xericum*, P. L.; *V. Album; White Wine*, P. E.; *V. Album Hyspanicum*, P. D.;) but several other wines are employed in medicine, as tonics, stimulants, antispasmodics, and restoratives. In pharmacy, the less expensive Cape or raisin wine is usually substituted for sherry in the preparation of the medicated wines of the Pharmacopœia.

Varieties, characteristics, &c. Our space will not permit a notice of the principal wines of commerce individually; the reader is therefore referred to the preceding Tables, which will convey much useful information on this subject in a condensed form.

Composition. The constituents of wine are—*alcohol*, which is one of its principal ingredients, and on which its power of producing intoxication chiefly depends;—*Sugar* which has escaped the process of fermentation, and which is most abundant in the sweet wines, as tokay, tent, frontignac, &c.;—*Extractive*, derived chiefly from the husk of the grape; its quantity diminishes by precipitation, owing to the gradual action of the atmosphere;—*Coloring matter;* this resides in the husk of the grape, and is extracted by the newly-formed alcohol; its natural color is blue or purple; its red tint is owing to the action of free acid;—*Tartar.* Bitartrate of potash constitutes the most important portion of the saline matter of wine, and appears to exercise an important influence over the fermentation. It is gradually deposited along with coloring matter by age;—*Odoriferous matter.* The characteristic vinous odor appears to depend upon the presence of œnanthic acid and ether, but the *bouquet of wine* arises from the essential oil, probably existing under the form of ether. Besides the above, small quantities of *tannin, gum, acetic* and *malic acids, acetic ether, lime, &c.*, exist in wine. The sp. gr. of wine depends on the richness and ripeness of the grapes used in its manufacture, the nature of the fermentation, and its age. It varies from 1·0627 to 1·1283. The sp. gr. of German wines is usually from 1·039 to 1·091, according to the season.

Purity. The most frequent species of fraud in the wine trade is the mixing of wines of inferior quality with those of a superior grade. In many cases the inferior kinds of foreign wine are flavored and substituted for the more expensive ones. This is commonly practised with *cape wine*, which, after having a slight "nuttiness" communicated to it by bitter almonds or peach kernels, a lusciousness, or fulness, by honey, and additional strength by a little plain spirit or pale brandy, is made to undergo the operation of "*fretting in*," and is then sold for *sherry*. Formerly, it was a common practice of ignorant wine-dealers to add a little litharge, or acetate of lead, to their inferior wines

* Alcohol of 0·825 contains 92·6% of real or anhydrous alcohol, and in round numbers may be said to be about twice the strength of brandy or rum, as usually sold.

to correct their acidity, but it is believed that this poisonous substance is now never employed in this country, and that the lead which is frequently detected in bottled wine may be traced to shot being left in the bottle, and not to fraud. The presence of lead in wine may be readily detected by the addition of a little sulphureted hydrogen, or a solution of any hydrosulphuret, which will in that case produce a black precipitate. Sherry is commonly colored in Spain by the addition of *must*, boiled down to one-fifth of its original volume, and in England by burnt brown sugar, or spirit coloring. Amontillado (a very nutty wine) is commonly added to sherries deficient in flavor; various other ingredients, as the essential oil of bitter almonds, bitter almonds in substance, cherry-laurel leaves and water, &c., are also employed for a like purpose. In Portugal the juice of elderberries is frequently added to *port wine* to increase its color, and extract of rhatany for the double purpose of improving its color, and imparting an astringent taste. The use of the former was once carried to such an extent that the Wine Company of Portugal put themselves to the expense and trouble of rooting out all the elder trees, and prohibiting their growth in the wine district. In England, beet-root, Brazil wood, the juice of elderberries and bilberries, the pressed cake from making elder wine, extract of logwood, &c., are frequently added to port to deepen its color; and oak sawdust, kino, alum, and extract of rhatany, to increase its astringency. Genuine red wines yield greenish gray precipitates with sugar of lead, and greenish ones with potassa; but those colored with elderberries, bilberries, and logwood, give *deep blue*, or *violet* precipitates, and those colored with Brazil, red sanders wood, or red beet, give red precipitates. *A factitious bouquet* is also commonly given to wine by the addition of sweetbrier, orris root, clary, elder-flowers, &c. The latter can only be detected by a discriminating and sensitive palate.

Uses. The uses of wine as a beverage are too well known to require description. As a MEDICINE, *port wine* is most esteemed as an astringent and tonic; and *sherry* and *Madeira* as stimulants and restoratives, in diseases where the acidity of the former would be objectionable; *champagne* is diuretic and excitant; and the *Rhenish wines* are refrigerant, diuretic, and slightly aperient. *Claret, Rhenish*, and *Moselle wines* are the most wholesome. In pharmacy wine is used as a menstruum.

MANAGEMENT OF WINE. *Age.* The sparkling wines are in their prime in from 18 to 30 months after the vintage, depending on the cellaring and climate. Weak wines, of inferior growths, should be drunk within 12 or 15 months, and be preserved in a very cool cellar. Sound, well-fermented, full-bodied wines are improved by age, within reasonable limits, provided they be well preserved from the air, and stored in a cool place, having a pretty uniform temperature. To promote the ripening of wine, some persons cover the mouths of the casks or bottles with bladder, and others remove them into a warmer situation. A very little dilute sulphuric acid is commonly added to the coarser wines for the same purpose; but a small quantity of pure acetic or tartaric acid would be preferable. 2 or 3 drops of the former, added to a bottle of some kinds of new wine, immediately give it the appearance of being 2 or 3 years old.

Bottling. The secret of bottling wine with success consists in the simple exercise of care and cleanliness. The BOTTLES should be all *sound, clean*, and *dry*, and perfectly free from the least *mustiness* or other odor. The CORKS should be of the best quality, and immediately before being placed in the bottles should be compressed by means of a "cork-squeezer." For superior or very delicate wines, the corks are usually prepared by placing them in a copper or tub, covering them with weights to keep them down, and then pouring over them boiling water, holding a little pearlash in solution. In this state they are allowed to remain for 24 hours, when they are drained, and reimmersed for a second 24 hours in hot water, after which they are well washed and soaked in several successive portions of clear rain water, drained, dried out of contact with dust, put into paper bags, and hung up in a dry place for use. The WINE should be *clear* and *brilliant*, and if it be not so, it must undergo the process of "fining" before being bottled. In fact, it is a common practice with some persons to perform this operation whether the wine requires it or not; as if it has been mixed and doctored, it "amalgamates and ameliorates the various flavors." The *bottles, corks*, and *wine* being ready, a fine clear day should be preferably chosen for bottling, and the utmost cleanliness and care should be exercised during the process. Great caution should also be observed to avoid shaking the cask so as to disturb the bottoms. The remaining portion that cannot be drawn off clear should be passed through the "wine bag," and when bottled should be set apart as inferior to the rest. The coopers, to prevent breakage and loss, place each bottle, before corking it, in a small bucket, having a bottom made of soft cork. They thus seldom break a bottle, though they "flog" in the corks very hard. When the wine is all bottled, it is stored in a cool cellar, and on *no account on the bottles' bottoms*, or in *damp straw*, but *on their sides*, in *sweet, dry sawdust or sand.*

Brandying. Brandy is frequently added to weak or vapid wines, to increase their strength, or to promote their preservation. In Portugal *one third* of brandy is commonly added to port before shipping it for England, as without this addition it generally passes into the acetous fermentation during the voyage. A little good brandy is also usually added to sherry before it leaves Spain. By recent regulations of the customs of England, 10§ of brandy may be added to wines in bond, and the increased quantity is only charged the usual duty on wine. The addition of brandy to wine injures its proper flavor, and hence is chiefly made to port, sherry, and other wines, whose flavor is so strong as not to be easily injured. Even when brandy is added to wines of the latter description, they require to be kept for some time to recover their natural flavor. To promote this object, the *wine doctors* employ the process called "*fretting in*," by which they effect the same change in 3 or 4 weeks, as would otherwise require some months, at the very least.

Cellaring. A wine cellar should be dry at bottom, and either covered with good hard gravel, or

be paved with flags. Its gratings or windows should open toward the north, and it should be sunk sufficiently below the surface to ensure an equable temperature. It should also be sufficiently removed from any public thoroughfare, as not to suffer vibration from the passing of carriages. Should it not be in a position to maintain a regular temperature, arrangements should be made to apply artificial heat in winter, and proper ventilation in summer. A celebrated wine establishment known to the writer, whose cellars are above ground, have a number of thermometers suspended on the walls, and whenever the mercury sinks below 48° F., several Arnot's stoves, arranged for that purpose, are immediately lighted, and their action properly watched and regulated.

Coloring. Wines are as commonly doctored in their color as their flavor. A *fawn yellow* and *golden sherry yellow* are given by means of a tincture or an infusion of saffron, turmeric, or safflower, followed by a little spirit coloring to prevent the color being too lively. All shades of *amber* and *fawn* to *deep brown* and *brandy* color, may be given by burnt sugar. *Cochineal* (either alone or with a little alum) gives a pink color;—beetroot and red sanders give a *red* color;—the extracts of rhatany and logwood, and the juice of elderberries, bilberries, &c., a *port wine* color. A hogshead of inferior pale sherry or white cape is commonly converted into a full-flavored *brown sherry* by the "honest" wine dealer, by the addition of ½ pint of spirit coloring, a gallon of brandy, and a few drops of the essential oil of bitter almonds dissolved in spirit; the whole being well mixed and fined down.

Decanting. This only refers to small quantities of wine, ready for consumption. In decanting wine, be careful not to shake or disturb the crust when moving it about or drawing the cork, particularly port wine. Never decant wine without a wine-strainer, with some fine cambric in it to prevent the crust and bits of cork going into the decanter. In decanting port wine do not drain it too near; there are generally two thirds of a wine-glass of thick dregs in each bottle, which ought not to be put in; but in white wine there is not much settling; pour it out, however, very slowly, and raise the bottle up gradually; it should never be decanted in a hurry. Be careful not to jostle the decanters against each other when moving them about, as they easily break, especially when full.

Decoloring. The color of wines is precipitated by age and by exposure to the light. It is also artificially removed by the action of milk, lime-water, or fresh-burnt charcoal. Wine merchants avail themselves of this property, for the purpose of whitening wines that have acquired a brown color from the cask, or which are esteemed pale; and also for turning "pricked" red or dark-colored wines, into white, in which a small degree of acidity is not so much perceived. The milk should be well skimmed before being mixed with the wine, and should be used in the same manner as ordinary finings, for which it will be found a good substitute. In this way *brown sherry* is commonly converted into *pale* or *gold-colored sherry*. For the latter purpose 1 to 3 pints are usually sufficient, but to decolor red wine 2 to 3 quarts or more will be required, according to the nature and intensity of the color, or the shade of color desired. Charcoal is seldom used, as it removes the flavor as well as color, but a very *little* milk of lime may sometimes be advantageously substituted for milk, when the wine has much acidity.

Fining. Wine is clarified in a similar manner to beer. White Wines are usually fined by isinglass, in the proportion of about 1½ oz. (dissolved in 1½ pints of water, and thinned with some of the wine) to the hogshead. Red Wines are generally fined with the whites of eggs, in the proportion of 12 or 18 to the pipe; they must be well beaten to a froth with about a pint of water, and afterwards with a little of the wine, before adding them to the liquor. Sometimes hartshorn shavings, or pale sweet glue, is substituted for isinglass; and for some strong red wines, abounding in tannin, a little sheep's or bullock's blood is very commonly employed. The use of blood is not, however, to be recommended, as it communicates a very trifling, but still an unpleasant flavor and odor, which is easily recognised by the palate of a professed "wine-taster;" besides which the practice is dirty and disgusting. Gypsum is frequently used to clear muddy white wines; as also milk of lime. Some persons add about 1 oz. of sugar of lead dissolved in water to a hogshead of such wine, and after well mixing it in, further add a like quantity of bisulphate of potash, (sal enixum,) also dissolved in water, and rummage well. In this process the sugar of lead is decomposed and falls down as an insoluble sulphate, and hence it is argued that it is not so dangerous as has been generally represented by Accum, and others afflicted with the poison mania. The use of lead, however, in any shape is objectionable, and should never be adopted by the wine-dealer, however *plausible* the above statements may appear. In France a person known to employ lead in wine would subject himself to fine and imprisonment. (See the latter part of the article Brewing.)

Flatness. This is best removed by the addition of a little new brisk wine of the same kind; or by rousing in 2 or 3 lbs. of honey, or bruised sultana raisins, and 3 or 4 quarts of good brandy per hogshead. By this treatment the wine will usually be recovered in about a fortnight, unless in very cold weather. Should it be wanted sooner, add a tablespoonful or two of yeast, and remove it to a warmer situation.

Flavoring. Various ingredients are added to inferior wines to give them the *flavor* of others more expensive, and to British wines to make them resemble those imported. Substances are also added in a similar manner to communicate the *aroma* of the highly-flavored grape wines. Among the *first* are *bitter almonds*, or the *essential oil of almonds*, or preferably its *alcoholic solution*, which are used to impart a sherry or nutty flavor to weak-flavored wines, as sherry, white cape, malt, raisin, parsnip, and other similar British wines;—*rhatany, kino, oak sawdust* and *bark, alum*, &c., to convey astringency, and—*tincture of the seeds of raisins* to impart a port wine flavor. Among the substances employed to communicate the bouquet of the *finer wines*, may be mentioned—*orris root, eau de fleures d'oranges, neroli, ambergris vanilla, violet petals, cedrat, sweetbrier, clary,*

elder flowers, *quinces*, *cherry-laurel water*, &c. By the skilful, though fraudulent use of the above flavoring substances and perfumes, the experienced wine-brewer manages to produce, in the dark cellars of London, from white cape, currant, gooseberry, raisin, rhubarb, parsnip, and malt wine, very excellent imitations of foreign wine, and which pass current among the majority of English wine-drinkers as the choicest productions of the grape, "*genuine as imported*."—A grain or two of ambergris, well rubbed down with sugar, and added to a hogshead of claret, gives it a flavor and bouquet much esteemed by some connoisseurs.

Improving. This is the cant term of the wine trade, under which all the adulteration and "doctoring" of wine is carried on. A poor *sherry* is improved by the addition of a little *almond flavor*, *honey*, *and spirit*;—a *port* deficient in body and astringency, by the addition of some red tartar, (dissolved in boiling water,) some kino, rhatany, or catechu, and a little honey and brandy.

Mixing. Few wines are sold without admixture. It is found that the intoxicating properties of wine are increased by mixing them with other wines of a different age and growth. In many cases the flavor is at the same time improved. Thus, a *thin port* is improved by the addition of a similar wine having a full body, or by a little Malaga, Teneriffe, or rich old sherry; and an *inferior old sherry* may be improved by admixture with a little full-bodied wine of the last vintage. In this consists the great art of "cellar management," and to such an extent is this carried, both abroad and in England, that it may be confidently asserted that no wine ever reaches the consumer in an *unmixed* or *natural* state.

Mustiness. This is easiest removed by violently agitating the wine for some time with a little of the sweetest olive or almond oil. The cause of the bad taste is the presence of an essential oil, which the fixed oil seizes on and rises with it to the surface, when it may be skimmed off. A little coarsely-powdered fresh-burnt charcoal, or even some slices of bread toasted black, will frequently have a like effect. A little bruised mustard is used by some persons.

Perfuming. This is chiefly performed on British wines for family use. For its application to foreign wines, see *flavoring*. Wines may be perfumed by the simple addition of any odorous substances previously well mixed with a little of the wine, or dissolved in a few oz. of spirit.

Racking. This should be performed in cool weather, and preferably early in the spring. To avoid disturbing the dregs, a clean syphon, well managed, will be found better than a cock or faucet. The bottoms, or foul portion, may be strained through a wine bag, and added to some other inferior wine.

Ripening. To promote the maturation of wine, various plans are adopted by the growers and dealers. One of the safest ways, especially for strong wines, is not to rack them till they have stood 15 or 18 months upon the lees, at the same time regulating the temperature upon the principles described under FERMENTATION. In this way, the slow or insensible fermentation which causes the maturation of wine, will be promoted, without the access of the acetous fermentation, or that which causes acidity.—*Another safe method* is, to remove the racked wine into a rather warmer situation than usual, observing properly to exclude the action of the air, which cannot be done with wine in wood, if the place be very dry.—*A third method* is to remove the corks or bungs, and to substitute bladder tied or fastened over air-tight. Bottled wine treated in this way, ripens very quickly in a temperate situation.

Roughening. A roughness or astringency is readily communicated to wine by the cautious use of kino, catechu, or rhatany.

Ropiness or viscidity. This arises from the wine containing too little tannin or astringent matter to precipitate the gluten, albumen, or other azotized substance, occasioning the malady. Such wine cannot be clarified in the ordinary way, because it is incapable of causing the coagulation or precipitation of the finings. The remedy is to supply the principle in which it is deficient. M. François of Nantes prescribes the bruised berries of the mountain ash (1 lb. to the barrel) for this purpose. A little catechu, kino, or the bruised foot stalks of the grape, may also be conveniently and advantageously used in the same way. Any other substance that precipitates albumen, may likewise be employed. See MALT LIQUORS and BREWING.

Second Fermentation. (La-pousse of the French.) Inordinate fermentation, either primary or secondary, in wine or any other fermented liquor, may be readily checked by racking it into a cask which has been previously fumigated with burning sulphur; or one half of the wine may be drawn off from the cask, and a lighted match, made by dipping some rags in melted brimstone, may be held by a pair of tongs in the bung-hole, slightly covered, so as to impregnate the liquor with the fumes. The decanted portion of the wine is then returned to the cask, which is immediately bunged down close, and well agitated for a few minutes. 1 oz. of brimstone thus employed is sufficient for a hogshead. This is the common plan adopted in the wine districts of France, either to allay the fermentation of wine, or to preserve *must* or grape juice in the sweet state.—*Another method*, which is very convenient and harmless, is to mix about ½ lb. to 1 lb. of bruised mustard seed with each hogshead.—*A fourth method* is to add to the wine about 1-1000th part, or less, of sulphite of lime. This substance seldom fails of arresting the fermentation.—In addition to the above remedies, a little sulphuric acid is sometimes employed, and the use of black oxide of manganese, or chlorate of potash, has been proposed on theoretical grounds.

Souring. This is either occasioned by the wine having been imperfectly fermented, or from its having been kept in a cellar where it has been exposed to too much heat or air, or to continual vibrations, occasioned by the passage of loaded vehicles through the adjoining thoroughfare. The common remedy recommended in books for this purpose, is to saturate the acid with chalk, milk of lime, or calcined oyster shells; but such additions, made in sufficient quantity to effect this object, destroy the character of the wine, and render it sickly and vapid. Formerly it was a very common practice to add litharge to alleviate the acidity; but the wine was thus rendered highly injurious to health, and frequently converted into a cer-

tain and *deadly poison.* Owing to the exertions of the Council of Salubrity, this practice has been wholly put down in France; and this example, combined with the easy means of detecting lead in wine, which are now so generally known, have also led to its discontinuance in England. The best and safest remedy is to mix it with a considerable portion of full-bodied new wine, adding at the same time a little brandy, and in 2 or 3 weeks to fine it down, and either to put it into bottles, or to consume it as soon as possible.

Sparkling, creaming, and briskness. These properties are conveyed to wine by racking it into close vessels before the fermentation is complete, and while there still remains a considerable portion of undecomposed sugar. Wine of this description which has lost its briskness, may be restored by adding to each bottle a few grains of white lump-sugar or sugar-candy. This is the way in which champagne is treated in France. The bottles are afterwards inverted, by which means any sediment that forms falls into the necks, when the corks are partially withdrawn, and the sediment is immediately expelled by the pressure of the gas. If the wine remains muddy, a little solution of sugar and finings are added, and the bottles are again placed in a vertical position, and after two or three months the sediment is discharged, as before. Sometimes this process is repeated a third and a fourth time, if the wine continues muddy.

Sweating in. The technical terms "*sweating*" and "*fretting in,*" are applied to the partial production of a secondary fermentation, for the purpose of "amalgamating" the flavor of foreign ingredients (chiefly brandy) added to the wine. For this purpose 4 or 5 lbs. of sugar or honey are commonly added to a hogshead, and when the wine is wanted in haste, a spoonful or two of yeast, or a little crude tartar, or bruised vine leaves, are also mixed in, or the cask is placed in a moderately warm situation till the effect is nearly complete, when it is removed to the wine-cellar, and fined down.

Taste of Cask.—The remedies for this malady are the same as for *mustiness.*

*** For further information connected with the nature and management of Wines, and other fermented liquors, see BREWING, FERMENTATION, MANURES, MALT LIQUORS, and the following articles.

WINE, BRITISH. The various processes in British wine-making resemble those employed for foreign wine, and depend upon the same principles. The FRUIT should be preferably gathered in fine weather, and not till it has arrived at a proper state of *maturity,* as evinced by its flavor when tasted; for if it be employed while *unripe,* the wine will be harsh, disagreeable, and unwholesome, and a larger quantity of sugar and spirit will be required to render it palatable. The common practice of employing unripe gooseberries for the manufacture of British champagne, arises from a total ignorance of the scientific principles of wine-making. On the other hand, if ordinary British fruit be employed too ripe, the wine is apt to be inferior, and deficient in the flavor of the fruit. The fruit being gathered, it next undergoes the operation of PICKING, for the purpose of removing the stalks and unripe or damaged portion. It is next placed in a tub, and is well bruised, to facilitate the solvent action of the water. Raisins are commonly permitted to soak about 24 hours previously to bruising them. The bruised fruit is then put into a vat or vessel with a guard placed over the tap-hole, to keep back the husks and seeds of the fruit when the *must* or extract is drawn off. The WATER is now added, and the whole is macerated for 30 or 40 hours, more or less, during which time the magma is frequently roused up with a suitable wooden stirrer The liquid portion is next drawn off, and the residuary pulp is placed in hair bags and undergoes the operation of PRESSING, to expel the fluid it contains. The sugar, tartar, &c., are now added to the mixed liquors, and the whole is well stirred. The temperature being suitable, the VINOUS FERMENTATION soon commences, when the liquor is frequently skimmed (if necessary) and well roused up, and, after 3 or 4 days of this treatment, it is run into CASKS, which should be quite filled, and left purging at the bunghole. In about a week the flavoring ingredients, in the state of coarse powder, are commonly added, and well stirred in, and in about another week, depending upon the state of the fermentation, and the attenuation of the must, the BRANDY or *spirit* is added, and the cask is filled up, and bunged down close. In four or five weeks more, the cask is again filled up, and, after some weeks, it is "pegged" or "spiled," to ascertain if it be fine or transparent; if so, it undergoes the operation of racking; but if, on the contrary, it still continues muddy, it must previously pass through the process of FINING. Its future treatment is similar to that already noticed under Foreign Wine. *** The must of many of the strong-flavored fruits, as black currants, for instance, is improved by being boiled before being made into wine.

GENERAL FORMULÆ FOR THE PREPARATION OF BRITISH WINES.

I. *From ripe saccharine fruits.*

1. Ripe fruit 4 lbs.; clear soft water 1 gallon; sugar 3 lbs.; cream of tartar, dissolved in boiling water, 1¼ oz.; brandy 2 to 3℥. Flavoring as required. Makes a good family wine.

2. As the last, but using 1 lb. more each of fruit and sugar. A superior wine.

3. As the *first,* but using 2 lbs. each additional fruit and sugar. Very strong. Is good without brandy, but better with it. *** 1½ lbs. of raisins may be substituted for each pound of sugar above.

In the above way may be made the following British wines:—GOOSEBERRY WINE, (*British champagne;*)—CURRANT WINE, (*red, white,* or *black;*)—MIXED FRUIT WINE, (currants and gooseberries, or black, red, and white currants, ripe black-heart cherries, and raspberries, equal parts;) this is a good family wine;—CHERRY WINE;—COLEPRESS'S WINE, (from apples and mulberries, equal parts;) —ELDER WINE;—STRAWBERRY WINE;—RASPBERRY WINE;—MULBERRY WINE, (when flavored makes *British port;*)—WHORTLEBERRY WINE, (*bilberry wine,*) makes a good factitious port;—BLACKBERRY WINE;—DAMSON WINE, (makes good factitious port;)—MORELLA WINE;—APRICOT WINE;—APPLE WINE;—GRAPE WINE;—TURNIP WINE; &c.

II. *From dry saccharine fruit,* (as raisins.)

1. Dry fruit $4\frac{1}{2}$ lbs.; clear soft water 1 gallon; cream of tartar (dissolved) 1 oz.; brandy $1\frac{1}{2}$ to 2℥. Weak.

2. As the last, but using dried fruit $5\frac{1}{2}$ lbs. A superior family wine.

3. As the last, but using dried fruit $7\frac{1}{2}$ lbs.; and brandy 2 to 3℥. A strong wine. Should the dried fruit employed be at all deficient in saccharine matter, 1 to 3 lbs. may be omitted, and half that quantity of sugar, or two thirds of raisins added.

*** In the above manner may be made the following wines:—RAISIN WINE—FIG WINE, &c.

III. *From acidulous, astringent, or scarcely ripe fruits, or those deficient in saccharine matter.*

1. Fruit $2\frac{1}{2}$ lbs.; sugar $3\frac{1}{2}$ lbs.; cream of tartar (dissolved) $\frac{1}{2}$ oz.; water 1 gallon; brandy 2 to 3℥. Weak refrigerant.

2. Fruit 3 lbs.; sugar $4\frac{1}{2}$ lbs.; cream of tartar $\frac{1}{2}$ oz.; water 1 gallon; brandy 2 to 3℥. A superior family wine.

3. As the last, but with $5\frac{1}{2}$ lbs. of sugar. A strong wine.

*** In the above way may be made the following wines:—GOOSEBERRY WINE, (*English champagne;*)—BULLYS WINE, (makes an excellent factitious port;)—DAMSON WINE; &c.

IV. *From footstalks, leaves, cuttings, &c.*

1. By infusing them in water, in the proportion of 3 to 5 lbs. to the gallon, or q. s. to give a proper flavor; and adding sugar to the strained liquor, in the proportion of 3 or 4 lbs. to every 6 or 7 lbs. of the cuttings used.

2. As the last, but substitute raisins $1\frac{1}{2}$ lbs. for each pound of sugar.

*** In the above way are made the following wines:—RAPE WINE, (from the pressed cake of grapes;)—ENGLISH GRAPE WINE;—RHUBARB WINE, (*patent* or *Bath champagne,*) from garden rhubarb; &c.

V. *From the saccharine roots and stems of plants.*

1. Bruised or sliced vegetable 4 or 5 lbs.; boiling water 1 gallon; infuse till cold, press out the liquor, and for each gallon use sugar 3 lbs.; cream of tartar 1 oz.; brandy about 2℥. For some roots and stems the water must not be very hot, as they are thus rendered troublesome to press.

2. As the last, but using 1 lb. more sugar.

*** In the above way may be made the following wines:—PARSNIP WINE, (*Malmsey;*)—TURNIP DO.; &c. &c.

VI. *From flowers, spices, aromatics, &c.*

These are prepared by simply infusing a sufficient quantity of the bruised ingredients for a few days in any simple wine (as that from sugar, honey, raisin, &c.) previously to racking.

In the above way are made the following wines: CLARY WINE, (*muscadell,*) from flowers 1 quart to the gallon;—COWSLIP WINE, (flowers 2 quarts to the gallon;)—ELDER-FLOWER WINE, (*frontignac,*) flowers of white berried elder $\frac{3}{4}$ pint, and lemon juice 2 oz. to the gallon;—GINGER WINE, ($1\frac{1}{4}$ oz. of ginger to the gallon;)—ORANGE WINE, (1 dozen sliced, to the gallon;)—LEMON WINE, (juice of 12 and rinds of 6 to the gallon;)—SPRUCE WINE, ($\frac{1}{4}$ oz. of essence of spruce to the gallon;)—JUNIPER WINE, (berries 1 pint to the gallon;)—PEACH WINE, (4 or 5 sliced, and the stones broken, to the gall.;)—APRICOT WINE, (as peach wine, or with more fruit;)—QUINCE WINE, (12 to the gallon;)—ROSE, CLOVE-GILLYFLOWER, CARNATION, LAVENDER, VIOLET, PRIMROSE, and other flower WINES, (distilled water 1 quart, or flowers 1 pint to the gallon;)—BALM WINE, (balm tops 4 oz. to the gallon;) &c.

VII. *From saccharine juices, or infusions, or from other fermented liquors.*

1. Juice or liquor 1 gallon; honey or sugar 2 lbs., (or raisins 3 lbs.;) cream of tartar $1\frac{1}{4}$ oz.; brandy $1\frac{1}{2}$ to 2℥. Very good.

2. As the last, but using one half more sugar, raisins, and brandy. Very fine.

*** In this way are made the following wines:—ENGLISH GRAPE WINE;—MIXED FRUIT WINE;—PINE APPLE WINE;—CIDER WINE;—ELDER WINE;—BIRCH WINE, (from the sap at the end of February or beginning of March;)—SYCAMORE WINE, (from the sap;)—MALT WINE, (*English Madeira,*) from strong wort;—and the wines of any of the saccharine juices of ripe fruit.

VIII. *From simple saccharine matter.*

1. Sugar $2\frac{1}{2}$ lbs.; cream of tartar $\frac{1}{2}$ oz.; water 1 gallon; honey 1 lb.; brandy 2 to 3℥. Weak.

2. As the last, but use sugar $3\frac{1}{2}$ lbs. Good.

3. As the last, but use sugar 5 lbs. Strong. A handful of grape leaves or cuttings, bruised, or a pint of good malt wort, or mild ale, may be substituted for the honey. *** The above are chiefly used as bases for other wines, as they have little flavor of their own. Raisin wine may be used instead.

†‡† In all the preceding formulæ lump sugar is intended when the wines are wanted very pale, and good Muscovado sugar when this is not the case. Some of the preceding *wines* are vastly improved by substituting good cider, perry, or pale ale or malt wort for the whole or a portion of the water. Good porter may also be advantageously used in this way for some of the red wines. When expense is no object, and very strong wines are wanted, the expressed juices of the ripe fruits, with the addition of 2 or 3 lbs. of sugar per gallon, may be substituted for the fruit in substance, and the water.

EXAMPLES OF BRITISH IMITATIONS OF FOREIGN WINES.

British Cape. Prep.—1. (*White.*) Raisin wine, either alone, or worked up with a little cider and pale malt wort.—2. (*Red.*) British white cape, sound rough cider, and mulberry wine, equal parts; well mixed, and fined down with white of egg or bullock's blood.

British Champagne. Prep.—1. (*White.*) *a.* Stoned raisins 7 lbs.; loaf sugar 21 lbs.; water 9 gallons; crystallized tartaric acid 1 oz.; Narbonne honey $\frac{1}{2}$ lb.; ferment with sweet yeast 1 lb or less; skim frequently, and when the fermentation is nearly over, add coarse-powdered orris root 1 drachm, and eau de fleurs d'oranges 3 oz.; lemon juice $\frac{1}{4}$ pint; rack it, bung close, and in 3 months fine it down with isinglass $\frac{1}{2}$ oz.; in 1 month more, if not sparkling, again fine it down, and in another fortnight bottle it, observing to put a piece of double-refined sugar, the size of a pea, into each bottle. The bottles should be wired, and covered

with tin foil, after the manner of champagne.—*b.* To the last, when the fermentation is nearly over, add perry (best pale) 3 gallons.—*c.* As the preceding, but substituting Muscovado sugar for raisins; or, what is still better, employ 28 lbs. of double-refined sugar.—*d.* Bruised amber, hairy champagne gooseberries, and cold spring water, equal parts; East India sugar 3½ lbs., to each gallon of the strained liquor; Madeira wine and pale old rum, of each 1 quart to every 10 gallons; fine down with isinglass, and bottle in 12 months. A sample of this wine obtained the prize of the Horticultural Society of Edinburgh. It is better, however, when made with lump sugar.—*e.* From English grapes and lump sugar.—*f.* From the stalks of garden rhubarb and lump sugar; a little sweetbrier, orris, or orange-flower water being added to give it a slight bouquet. This forms the *patent* or *Bath champagne*, of the Champagne Wine Company.—2. (*Pink.*) To either of the preceding, add a little red currant juice to color, or 1 oz. of coarsely-powdered cochineal to each 10 or 12 gallons, at the time of racking.

*** The above formulæ, managed with judgment, produce very exact imitations of genuine champagne. In fact, it is notorious that two bottles of wine out of every three sold under this denomination in England, is of British manufacture. I have myself seen sparkling gooseberry, rhubarb, and white sugar wines, sold for imported champagne, at 7s. 6d. per bottle, and the fraud has passed undetected even by habitual wine-drinkers.

British Claret. Prep. 1. Good cider and port wine equal parts.—2. To each gallon of the last add cream of tartar (genuine) 3 drs., and the juice of one lemon.—3. To either of the preceding add French brandy 2 oz.—4. Instead of port, use red cape or British port. *** If the first three of the above are well mixed and fined down, and not bottled for a month or five weeks, they can scarcely be distinguished from good "Bordeaux." A mixture of 4 parts of raisin wine with 1 part each of raspberry, and barberry or damson wine, also forms an excellent factitious claret.

British Cyprus. Prep. From the juice of white elderberries 1 quart, and Lisbon sugar 4 lbs. to water 1 gallon, together with ½ dr. each of bruised ginger and cloves. When racked add raisins and brandy, of each 2 oz.

Honey Wine, (American.) Prep. Honey 20 lbs.; cider 12 gallons; ferment, then add rum ½ gallon, brandy ½ do., red or white tartar (dissolved) 6 oz., bitter almonds and cloves, of each ¼ oz. This is also called *Mead Wine.*

British Madeira. Prep. Pale malt, ground, 4 bushels; boiling water 44 gallons; infuse, strain off this while warm, take 24 gallons, and add sugar candy 14 lbs., and cream of tartar 3 oz.; when dissolved, add yeast 2 lbs.; ferment, keep skimming off the yeast, and when the fermentation is nearly finished, add raisin wine 2½ gallons; brandy and sherry wine, of each 2 gallons; rum 1 quart; bung it down for 6 or 9 months. A second infusion of the malt may be made for beer.

British Malmsey. Prep. 1. Sliced parsnips 4 lbs.; boiling water 1 gallon; when cold press out the liquor, and to each gallon add cream of tartar ½ oz., and good Muscovado sugar 3 lbs.; ferment, rack, and add brandy 2 to 3℥.—2. Good malt wort 1 gallon; lump sugar 1½ lbs.; Malaga raisins 2 lbs.; brandy 3 to 4℥ of the racked liquor

British Port. Prep. 1. Red cape 2 gallons; damson or elder wine 1 gallon; mix.—2. To the last add brandy ½ pint; powdered kino 1 dr.—3. (*Southampton Port.*) Cider 3 gallons; elder and damson wine, of each 1 gallon; brandy 3½ pints.—4. Cider 24 gallons; juice of elderberries 6 gallons; port wine 4 gallons; brandy 1½ gallons; logwood 1 lb.; isinglass 12 oz., dissolved in a gallon of the cider; bung it down; in 2 months it will be fit to bottle, but should not be drunk until the next year; if a rough flavor is required, alum 4 to 6 oz. may be added.—5. (*London Port.*) Good rough cider, red cape, port, and elder wine, of each 6 gallons; brandy 1 gallon; as last.

*** To make the above wine form a crust on the inside of the bottle, a spoonful of powdered catechu, or ½ a spoonful of finely-powdered cream of tartar is added to each bottle before corking. It is also a common practice to put the crust on the bottle *before putting the wine into it*, by employing a hot saturated solution of red tartar, thickened with gum, and some powdered tartar. By adding a little lemon juice, and a "*streak*" of orris or orange-flower water to British port, the ingenious wine-brewer converts it into "*British Burgundy.*" The latter is also made by mixing together equal parts of British port and claret.

British Sherry. Prep. 1. Cape or raisin wine slightly flavored with a *very little* bitter almond cake, or, what is more convenient, a little of the essential oil dissolved in alcohol, (*essence of bitter almonds.*)—2. To the last add a *minute* quantity of sweetbrier, eau de fleurs d'oranges, or orris, to give it a *very slight* bouquet.—3. To each gallon of strong raisin must, add, when racking, 1 Seville orange and 2 bitter almonds, both sliced. By omitting the almonds, and adding 2 or 3 green citrons to each 10 gallons, this forms British Madeira. —4. Loaf sugar 32 lbs.; sugar candy 10 lbs.; water 16 gallons; boil, add pale ale wort (as for Madeira) 6 gallons; yeast 1 lb.; on the third day add raisins, stoned, 10 lbs.; and in another 2 or 3 days brandy 1 gallon; bitter almonds, grated, 1 dr.; bung it down for 4 months, draw it off into another cask, add brandy 1 gallon, and in 3 months bottle it.—5. Teneriffe, slightly flavored with cherry-laurel or almonds, forms a most excellent British sherry, either alone or diluted with an equal quantity of Cape or raisin wine.

*** The preceding formulæ, by skilful management, produce very good imitations of some of the imported wines; but many of the British fruit wines possess an equally agreeable flavor, and are frequently more wholesome. All British wine requires to be kept at least a year to "*mellow.*" Much of the superiority of foreign wine arises from its *age.*

WINES, IMPREGNATED. These are either used in pharmacy or in cookery. The medicated wines (*vina medicata*) are prepared in the same manner as tinctures; they should be made in well-closed vessels and macerated without heat. The L. PH. of 1824 substituted a diluted spirit for wine, still retaining the name; but the wine (*sherry*) was restored in that of 1836. The druggists commonly use *cape* or *raisin wine* as a menstruum, as being cheaper than sherry and equally efficacious.

The *vinum'* of the P. U. S. is *Teneriffe.* The following are the principal impregnated wines used as medicine, or as flavoring.

WINE, ALOES. Syn. *Tinctura Sacra. T. Hieræ Picræ. Vinum aloes,* (P. L. E. & D.) *Prep.* (P. L.) Powdered aloes ℥ij; do. canella ℥ss; sherry 1 quart; macerate 14 days. The P. E. substitutes cardamoms and ginger, of each ʒiss, for canella. *Dose.* As a purgative f℥ss to f℥ij; as a stomachic fʒj to fʒij.

WINE, ANTIMONIAL. Syn. *Tartar Emetic Wine. Wine of Potassio-tartrate of Antimony. Vinum Antimonii Tartarizati,* (P. L. 1788.) *Liquor do.,* (P. L. 1809 and 1824.) *V. Antimonii Potassio-tartratis,* (P. L. 1836) *Vinum Antimoniale,* (P. E.) *Liq. Tartari Emetici,* (P. D.) *Prep.* (P. L. & E.) Tartarized antimony ℈ij; sherry 1 quart; dissolve. Each fluid oz. contains 2 grs. of emetic tartar. *Dose.* As a diaphoretic and expectorant 10 to 30 drops, frequently; as a nauseant fʒj to fʒij; as an emetic fʒij to f℥ss.

WINE, BASIL. Green basil leaves 4 or 5 oz.; sherry or cape, 1 pint; digest for 10 days. *Used* to give a turtle flavor to soups and gravies. ⁂ In a similar way may be made the *wines* of *celery leaves and seed, shalotes,* and the various *green* and *dried herbs* used in cookery.

WINE, CAYENNE. *Prep.* Cayenne 1 oz., sherry or cape 1 pint; steep for a fortnight, and strain. ⁂ In a similar way may be made *Currie, (powder,) ragout, (spice,)* and several other similar wines used in the kitchen.

WINE, COLCHICUM. (ROOT.) Syn. *Vinum* (Cormi) *Colchici,* (P. L. & E.) *Prep.* (P. L.) Sliced and dried corms of meadow saffron ℥viij; sherry wine 1 quart; macerate 14 days. *Dose.* fʒss to fʒj; in gout, &c.

WINE, COLCHICUM. (SEED.) Syn. *Vinum Seminum Colchici. Prep.* (Dr. Williams.) Seeds of meadow saffron (preferably ground in a coffee-mill) ℥ij; sherry f℥xvj; as last. *Dose.* fʒss to fʒiss; in gout, &c.

WINE, GENTIAN. Syn. *Bitter Wine. Vinum Amara. Vinum Gentianæ,* (P. E.) *Prep.* Gentian in coarse powder ℥ss; yellow bark (do.) ℥j; dried orange-peel ʒij; canella in coarse powder ʒj; proof spirit f℥ivss; digest for 24 hours, then add sherry 1 pint and f℥xvj, and further digest for 7 days. Tonic and stomachic. *Dose.* ½ to 1 oz.

WINE, HELLEBORE. Syn. *Tincture of White Hellebore. T. Veratri Albi. Vinum Veratri,* (P. L.) *Prep.* White hellebore, sliced, ℥viij; sherry wine 1 quart; digest 14 days. *Dose.* 10 drops, 2 or 3 times daily, gradually increased; as a substitute for colchicum in gout and rheumatism.

WINE, HELLEBORE, (OPIATED.) Syn. *Mr. Moore's Eau Médicinale. Prep.* White hellebore wine ʒiij; tincture of opium ʒj; mix.

WINE, IPECACUANHA. Syn. *Vinum Ipecacuanhæ,* (P. L. E. & D.) Bruised ipecacuanha root ℥iiss; sherry 1 quart; macerate for 14 days. *Dose.* As a diaphoretic and expectorant, 10 to 40 drops; as an emetic fʒij to f℥ss.

WINE, IRON. Syn. *Chalybeate Wine. Vinum Ferri. Prep.*—1. (P. L. 1809.) Iron filings ℥ij; sherry 1 quart; digest with frequent agitation for a month.—2. (P. L. 1824.) Iron filings ℥j; cream of tartar ʒvj; water f℥j; mix, expose in an open vessel to the air for 6 weeks, adding water as required, then dry, powder, dissolve in water f℥xxx and add proof spirit f℥xx. Rejected from the P L. 1836. A mild chalybeate tonic. *Dose.* 1 to 4 drs.

WINE OF OPIUM. Syn. *Vinum Opii,* (P. L. E. & D.) *Laudanum liquidum Sydenhami,* (P. L. 1720.) *Tinctura Thebaica,* (P. L. 1745.) *Sydenham's liquid Laudanum. Prep.*—1. (P. L.) Extract of opium, P. L., ℥iiss; cloves and cinnamon ʒiiss; sherry 1 quart; macerate for 14 days. —2. (*Wholesale.*) Extract of opium 10 oz.; oil of cassia 25 drops; oil of cloves 20 drops; rectified spirit 1½ pints; water 6½ pints; coloring q. s.; digest with agitation till dissolved. Milder than the tincture. *Dose.* 10 to 60 drops as an anodyne and hypnotic.

WINE OF OPIUM, (FERMENTED.) Syn. *Rousseau's Laudanum. Black-drop. Vinum Opii Fermentatione Paratum. Prep.* (P. Cod.) Opium ℥iv; boiling water ℥LX; dissolve, add honey ℥xij; yeast ʒij; keep it at 86° F. for a month, or till the fermentation is complete; press, filter, distil off ℥xvj, and evaporate the residue to ℥x; distil the ℥xvj of spirit obtained above, till ℥xij have passed over; and from this, by a third distillation, obtain ℥ivss, which add to the evaporated solution, (℥x,) and filter. Considerably stronger than laudanum. (See BLACK-DROP.)

WINE, TOBACCO. Syn. *Vinum Tabaci. Prep.* (P. E.) Tobacco leaves ℥iiiss; sherry 1 quart; digest 7 days, strain with strong pressure, and filter. Sedative and diuretic. *Dose.* 10 to 50 drops in dropsy, &c.

WINE, RHUBARB. Syn. *Vinum Rhæi,* (P. E.) *V. Rhæi Palmati. V. Rhabarbari. Tinctura Rhæi Vinosa. Prep.* (P. E.) Rhubarb in coarse powder ℥v; canella (do.) ʒij; proof spirit f℥v; sherry f℥xxxv; macerate for 7 days, press, and filter. *Dose.* As a stomachic fʒj to fʒiij; as a purgative f℥ss to f℥j.

WINE TEST. *Prep.*—1. (Hahnemann's.) Quicklime ℥j, flowers of sulphur ℥iss; heat in a covered crucible for 5 or 6 minutes; of this take ʒij, tartaric acid ʒij; powder, mix, and shake in a stopped bottle with a pint of water; let it settle, pour off the clear, and add tartaric acid ℥iss.—2. (Dr. Paris's.) Expose equal parts of sulphur and powdered oyster shells to a white heat for 15 minutes, and when cold, add an equal quantity of cream of tartar; these are to be put into a strong bottle, with common water, to boil for an hour, and the solution is afterwards to be decanted into ounce vials, adding twenty drops of muriatic acid to each. Both the above tests will throw down the least quantity of lead from wines, as a very sensible black precipitate. As iron might be accidentally contained in the wine, the muriatic acid is added to the last test to prevent the precipitation of that metal.

WOAD. *Syn.* GLASTUM. ISATIS TINCTORIA. VOUEDE; PASTEL, (*Fr.*) WAID, (*Ger.*) From woad leaves, by grinding them to a paste, of which balls are made, placed in heaps, and occasionally sprinkled with water to promote the fermentation: when this is finished, the woad is allowed to fall down into large lumps. On diluting the powder with boiling water, and, after standing for some hours in a close vessel, adding about one-twentieth its weight of lime newly slaked, digesting in a

gentle warmth, and stirring the whole together every 3 or 4 hours, a new fermentation begins; a blue froth rises to the surface, and the liquor, though it appears itself of a reddish color, dyes woollen of a green; which, like the green from indigo, changes in the air to a blue. This is one of the nicest processes in the art of dyeing, and does not well succeed in the way of a small experiment *Used* to dye blue, but mostly in combination with indigo. Both dye-stuffs are employed in the same way. 50 lbs. of woad are reckoned equal to 1 lb. of indigo.

WOOD is *polished* by carefully rubbing down the grain with fine glass-paper, or pumice-stone, and then rubbing it, first with finely-powdered pumice-stone and water, and afterwards with tripoli and linseed oil, till a proper surface is attained.

Wood is *stained* by the application of any of the ordinary liquid dyes employed for wool or cotton. They sink deeper into the wood when they are applied hot. When the surface is properly stained and dried, it is commonly cleaned with a rag dipped in oil of turpentine or boiled oil, after which it is varnished or polished. ***Musical instruments, articles of the toilette, &c.***, are usually treated in this way. (See Dyes for Bone and Ivory.)

WOOL, SPANISH. *Syn.* Bezetta rubra, B. di Levante. *Prep.* Separate the coloring matter from safflower, as in making rouge; using white crape to take the color from the second solution in subcarbonate of soda-water. *Used* to color the cheeks by rubbing the wool upon them.

WORM CAKES. 1. (Storey's.) *Prep.* Calomel ℈j; jalap ʒj; ginger ℈ij; white sugar 1 oz.; vermilion to color; all in powder; beat to a mass with simple sirup, and divide into 20 cakes. Each cake contains 1 gr. of calomel. *Dose.* 2 to 4 early in the morning, fasting.—2. Scammony 2 oz.; calomel 1 oz.; white sugar 2 lbs.; mucilage of tragacanth made with rose-water, q. s. to make a mass; divide into 1960 lozenges. Each lozenge weighs about 8 grs., and contains ½ gr. of calomel and ½ gr. of scammony.—3. As the last, but substitute resin of jalap for scammony, and divide into only 980 lozenges. Each lozenge contains ½ gr. of calomel, and 1 gr. of resin of jalap.

WORM DRENCHES. *Prep.* 1. Common salt ½ lb.; aloes ½ oz.; boiling water 1 quart; dissolve.—2. Oil of turpentine 4 oz.; gruel 1½ pint; mix.—3. Oil of turpentine 4 oz.; linseed oil 8 oz.; thick gruel ½ a pint; mix well. *Used* by farriers for horses.

WORMWOOD, (Swiss Extract of.) *Syn.* Extract d'Absinthe de Suisse. *Prep.* Tops of absinthium majus 4 lbs.; do. absinthium minus 2 lbs.; angelica root, calamus aromaticus, seeds of anisum chinæ, leaves of the dittany of Crete, of each 15 grs.; alcohol at 20° B. 4 gallons; macerate for 10 days, then add water 1 gallon, and distil 3 gallons by a gentle heat. Tonic and stomachic. Served round at some tables after wine has been taken freely, to recruit the stomach, and enable it to bear more.

WRITING FLUIDS. *Prep.* I. (*Black.*)—*a.* Caustic soda ʒj; water 1 pint; dissolve, and add Indian ink, scraped fine, q. s. to give a proper degree of blackness. Permanent, incorrodible, and flows well from steel pens.—*b.* Shellac 4 oz.; borax 2 oz.; water 1 quart; boil till dissolved, add gum arabic, dissolved, 2 oz.; boil, strain, and further add enough of a mixture of equal parts of calcined lamp-black and indigo previously triturated to an impalpable fineness, to produce a proper color; agitate well, let it stand 2 or 3 hours to deposite the coarser portion of the powder, and bottle for use. Incorrodible, and indestructible when *dry*. It resists the action of water, oil, turpentine, alcohol, the dilute acids, chlorine, alkalis, or other reagents, unless when so concentrated as to destroy the paper. It flows easier when the gum is omitted.

II. (*Blue.*) *a.* Dissolve ceruleo-sulphate of potassa or ammonia in hot water, and when cold decant the clear. It is an intense blue, and dries nearly black; is perfectly incorrosive, and very permanent and easy flowing. It may be thickened with gum water, or diluted with pure rain water, as required.—*b.* Dissolve blue carmine or soluble indigo in distilled water, as above. Resembles the last, but is *scarcely* equal to it.—*c.* Dissolve basic or soluble Prussian blue in pure water. This is the most permanent and beautiful ink known. It is not affected by the addition of alcohol, but is immediately precipitated by saline matter. The precipitate, however, still possesses the property of dissolving in pure water.—*d.* Dissolve the soluble ferrocyanide of potassium and iron in pure water, as before. Resembles the last, but is precipitated from its solution by alcohol. Either of the preceding *blue fluids* may be used as indelible ink to mark linen, and will be found very permanent, provided the part be first moistened with alum water and dried.

*** Soluble Prussian Blue (*Basic do. Basic sesquiferrocyanide of iron*) is obtained by adding a solution of protosulphate of iron to a solution of ferrocyanide of potassium, (*Prussiate of potash.*) A *bluish-white* precipitate, turning *dark blue* by exposure, is formed, which is washed till it begins to dissolve in the water, and color it blue, when it is either collected and dried, or at once dissolved in *pure* water.—Soluble Ferrocyanide of Potassium and Iron is made by precipitating a solution of a persalt of iron (as the persulphate, pernitrate, peracetate, or sesquichloride) by a *stronger* solution of ferrocyanide of potassium, so that the latter may be in considerable excess. A blue precipitate is formed, which must be treated as before.

XANTHIC ACID. *Syn.* Hydroxanthic Acid. Bisulphocarbonate of oxide of ethule. (From ξανθὸς, *yellow*, and γεννάω, *I generate.*) A peculiar acid, composed of sulphur, carbon, hydrogen, and oxygen, discovered by Zeise. *Prep.* Dry xanthate of potassa is mixed with dilute sulphuric or muriatic acid. After a time a milky liquid is formed, from which, by the addition of more water, a heavy oily substance is deposited, which must be quickly washed with water, and dried by standing over chloride of calcium. This is hydrated xanthic acid. *** A nearly colorless, inflammable, oily liquid, having a bitter taste and a peculiar, penetrating, disagreeable odor. It is decomposed at a temperature above 75° F. *The compounds* of xanthic acid are mostly of a yellow

color; hence its name.—Xanthate of Potassa, (*Bisulphocarbonate of oxide of ethule and Potassa*, Liebig,) is obtained by adding bisulphuret of carbon to a saturated solution of fused caustic potassa in absolute alcohol, as long as it is dissolved. By cooling the solution to 32°, it forms a semi-solid mass of crystals, which, after being washed with ether, and pressed between bibulous paper, must be dried out of contact with the air. Soluble in water and alcohol.

XANTHINE. This name has been given by Kuhlman to the yellow coloring matter of madder.

YEAST. *Syn.* Barm. Zumin. Fermentum, (*Lat.*, from *ferveo*, to ferment.) The froth of fermenting worts. According to Liebig, yeast is a substance in a state of putrefaction or fermentation, the atoms of which are in a continual motion, and this condition it communicates by contact, to fermentable substances. (See Fermentation.)

YEAST or BARM, (ARTIFICIAL.) *Prep.* I. Method of preparing Yeast without a Ferment.—*a.* It has long been considered a desideratum to obtain a method of making yeast directly and without the aid of any portion of that substance. Mr. Fownes has published in the 'Transactions of the Chemical Society,' a method which, although he seems to regard it as new, is to be found in the Chemistry of Boerhaave. Nevertheless it seems to have been long lost sight of, and Berzelius, as quoted by Mr. Fownes, states, "that although the conversion of a small into a large quantity of yeast is a very easy thing, yet to produce that substance from the beginning is very difficult." The plan of Mr. Fownes, which is substantially the same as that of Boerhaave, is as follows:—Common wheat flour is to be mixed with water into a thick paste, and kept, slightly covered, in a moderately warm place, for some time. About the third day, it begins to emit a little gas, and to exhale a disagreeable, sour odor, like stale milk; after the lapse of a few days, that is, about the sixth or seventh day, the smell changes, much gas is evolved, accompanied by a distinct and agreeable vinous odor, and it is then in a state to excite the vinous fermentation. A quantity of wort is next to be prepared, and boiled with hops, in the same manner as in the brewing of beer, and when cooled to 90° or 100°, the decomposed dough, thoroughly mixed with tepid water, is to be added, and the whole is to be kept in a warm situation. After the lapse of a few hours, active fermentation takes place, carbonic acid is disengaged, and when the action is complete, and the liquor clear, a large quantity of yeast, of excellent quality, is found at the bottom of the vessel. In one experiment, the following materials were used:—A small handful of ordinary wheat flour was made into a paste with cold water, covered with paper, and left seven days on the mantel-shelf of a room where a fire was kept all day, being occasionally stirred; at the end of that period three quarts of malt were mashed in two gallons of water, the infusion boiled with the proper quantity of hops, and, when sufficiently cooled, the ferment added. The result was a quantity of beer, not very strong, but of an agreeable flavor, and a pint of thick yeast, perfectly good for making bread. This must be valuable to colonists and residents in the country. Malt is easily made, and hops may be omitted, or superseded by some other bitter. (Lancet.)

b. Honey 5 oz.; powdered tartar 1 oz.; malt 1 lb.; water at 122° F. 3 pints, or q. s.; stir well together, and allow the whole to rest for 2 or 3 hours, or till the temperature sinks to about 65°, at which it must be kept, covered over, when yeast will be eliminated.

c. Boil malt, a quarter of a peck, in 3 pints of water; pour off 2 pints, and keep it in a warm place for 30 hours; add 4 pints of a similar decoction, stir it well in, again ferment, and repeat this addition of 4 pints until a sufficient quantity of yeast is obtained: 10 pints will yield yeast sufficient for a brewing of 40 gallons; it is preferable to brewers' yeast, particularly when used for raising dough.

II. With a Ferment.—*a.* (Ure.) Bean flour ¾ lb.; water 6 quarts; boil for ½ an hour, pour the decoction into any suitable vessel, add wheat flour 3½ lbs.; stir well together, and when the temperature reaches 55°, add beer yeast 2 quarts; mix well, and keep the mixture in a situation where it will not be chilled. In 24 hours after the commencement of the fermentation add barley or bean flour 7 lbs., make a uniform dough by thorough kneading, roll it out as thin as a dollar, and cut it with a wine-glass into small cakes, which must be placed on sieves or laths, and dried in the sun, and then preserved in a dry situation. *For use*, one of these discs is to be broken into pieces, laid in warm water, and set in a warm place during 12 hours, when the soft mass will serve the purpose of beer yeast.

b. Mix 2 quarts of water with wheat flour, to the consistence of thick gruel, boil it gently for half an hour, and when almost cold, stir into it ½ lb. of sugar, and four spoonfuls of good yeast. Put the whole in a large jug or earthen vessel, with a narrow top, and place it before the fire, so that it may, by a moderate heat, ferment. The fermentation will throw up a thin liquor, which pour off and throw away; keep the remainder for use (in a cool place) in a bottle, or jug tied over. The same quantity of this, as of common yeast, will suffice to bake or brew with. Four spoonfuls of this yeast will make a fresh quantity as before, and the stock may be always kept up, by fermenting the new with the remainder of the former quantity.

Remarks. The preparation of substitutes for yeast, has long engaged the attention both of the scientific chemist and the practical tradesman. The periodicals at one time literally teemed with these formulæ, and even at the present day some of the minor publications amuse their readers in the same way. The above processes are the best known, and if well managed will prove all that can be desired. It were easy to multiply receipts on this subject, were they to be indiscriminately selected, but the mass of those published are either mere trash, or repetitions of others long known. Not more than *one* in *a thousand* answers when tried. *⁎* Ordinary beer yeast may be kept fresh and fit for use for several months, by placing it in a close canvass bag, and gently squeezing out the moisture in a screw press till the remaining matter becomes as stiff as clay, in which state it must

be preserved in close vessels. This method is generally adopted by the brewers in Flanders. *Another* method is to well whisk the yeast till it forms a uniform liquid mass, and then to lay it with a soft paint-brush evenly and thinly on dishes, or any convenient surface, on which it can be exposed to the sun or air; and the operation must be repeated as soon as the first coat is sufficiently solid, and so on, till the layers acquire a proper thickness, when it must be detached and preserved as before. If rendered quite dry, its power of exciting fermentation will be destroyed.

YELLOW DYE. *Syn.* TEINTURE JAUNE, (*Fr.*) The following substances impart a yellow to goods, either at once, or after they have been mordanted with alumina or tin:—*annotto, dyer's broom, fustic, fustet, French berries, quercitron bark, turmeric, barberry root.* Goods mordanted with acetate of lead, and afterwards passed through a bath of chromate of potash, acquire a brilliant *chrome yellow* color; solution of sulphate or acetate of iron, followed by immersion in potash or lime-water, gives a *yellow, buff,* or *orange,—orpiment* dissolved in ammonia imparts a golden yellow.

YELLOW, NAPLES. *Syn.* JAUNE MINERAL, (*Fr.*) GIALLOLINO, (*Ital.*) *Prep.* I. Metallic antimony 12 lbs.; red lead 8 lbs.; oxide of zinc 4 lbs.; mix, calcine, triturate well together, and fuse in a crucible; the fused mass must be ground and elutriated to a fine powder.

II. Lead 3 lbs.; common antimony 2 lbs.; alum and common salt 2 oz.; calcined together.

III. Flake white 1½ lbs.; diaphoretic antimony ¼ lb.; calcined alum 1 oz.; sal ammoniac 2 oz.; calcine in a covered crucible with a moderate heat for 3 hours, so that at the end of it, it may be barely red hot. More antimony and sal ammoniac turns it on the gold color. *Used* in oil and in porcelain painting and enamelling.

YELLOW, PATENT. *Syn.* MONTPELLIER YELLOW. OXICHLORIDE OF LEAD. SUBMURIATE OF DO. *Prep.* I. Common salt 1 cwt. and litharge 4 cwt., are ground together with water, and kept for some time in a gentle heat, water being added to supply the loss by evaporation; the carbonate of soda is then washed out with more water, and the white residuum heated till it acquires a fine yellow color. *Used* as a paint.

II. Dry chloride of lead 14 oz.; pure carbonate of lead 13½ oz.; grind together, fuse and powder. *Used* as a paint.

YELLOW, WELD. *Prep.* Fine whiting 4 lbs.; water 4 pints; boil together into a smooth paste, and add, gradually, alum ½ oz. in fine powder. Boil weld in water for a quarter of an hour, strain, and add the liquor to the pap of whiting and alum until the desired shade of color is obtained; pour into earthen pans, and dry on chalk. *Used* by the paper-hanging makers.

YTTRIA. *Syn.* OXIDE OF YTTRIUM. A white earth discovered by Gadolin in 1794, in a mineral from Ytterby in Sweden, since called Gadolinite. Its sp. gr. is 4·842; its salts have in general a sweetish taste, and the sulphate and several others an amethyst color. Its solutions are precipitated by pure alkalis, but alkaline carbonates, especially carbonate of ammonia, dissolve it in the cold. It is distinguished from glucina by the color of its sulphate, by being insoluble in pure alkalis, and by yielding a white precipitate with prussiate of potash. Yttria may be obtained by a similar process from Gadolinite to that by which glucina is extracted from the beryl.

YTTRIUM. The metallic base of Yttria. It may be obtained in a similar way to that described under glucinium. It is brittle, and has a dark gray color.

ZAFFRE. *Syn.* SAFFRA. SAFFLOR. Roasted cobalt ore reduced to a very fine powder and ground with 2 or 3 parts of very pure quartzose or silicious sand. *Used* as a blue color by enamellers and painters on porcelain and glass. Chiefly imported from Saxony. Zaffre fused in an earthen crucible with about half its weight of potash, and the melted mass poured into water and afterwards ground into an impalpable powder, forms the beautiful azure pigment called *smalts.*

ZEINE. A name given by Gorham to a yellow waxy substance, obtained by treating the portion of maize or Indian corn, insoluble in water, with alcohol, and evaporating the solution.

ZIMOME. (From ζυμη, *ferment.*) A name given by Taddei to the portion of wheat gluten insoluble in alcohol. (See GLUTEN.)

ZINC. *Syn.* SPELTER. ZINC, (*Fr. & Sp.*) ZINK, (*Ger., Dut., Swed., & Dan.*) ZINCO, (*Ital.*) ZINCUM, (*Lat.*) This metal was first mentioned by Paracelsus in the 16th century, who called it *zinetum.* Its ores must, however, have been previously known, as the ancients were acquainted with the manufacture of brass. The *zinc of commerce* is obtained from the native sulphuret (*zinc blende*) or carbonate, (*calamine,*) by roasting those ores, and distilling them along with carbonaceous matter in a covered earthen crucible, having its bottom connected with an iron tube which terminates over a vessel of water situated beneath the furnace. The first portion that passes over contains cadmium and arsenic, and is indicated by what is technically called the "*brown blaze;*" but when the metallic vapor begins to burn with a bluish white flame, or the "*blue blaze*" commences, the volatilized metal is collected.

Pur. Commercial zinc is never pure. According to the London Ph. its sp. gr. is 6·86, and it is almost entirely soluble in diluted sulphuric acid, forming a colorless solution. When tested in a Marsh's apparatus it should yield no trace of arsenic. The following method, by which several pounds of chemically pure zinc may be obtained in about ¼ of an hour, will be found very useful:—Melt the zinc of commerce in a common crucible, and throw it into a tolerably deep vessel of water, taking care that the metal be very hot at the moment of running. This operation is not without its use, for the more granulated the zinc, the easier it is purified. Dry the grains, and dispose them by layers in a Hessian crucible with one-fourth of their weight of nitrate of potash, using the precaution to place a slight excess at the top and at the bottom. Cover the crucible, and secure the lid, then apply heat: a vivid deflagration takes place with great disengagement of light, after which remove the crucible from the fire, separate the dross with a tube, and lastly, run the zinc into an ingot mould. This zinc, submitted to Marsh's apparatus during entire days, has never given any stain, and

in solution the most sensible reactives—such as hydro-sulphocyanic acid—have never indicated the least atom of iron. (Journ. de Pharm.)

Props., Uses, &c. Zinc is a bluish white metal, having the sp. gr. 6·8 to 7·2; tough when cold, ductile and malleable at from 212° to 300°, brittle, and easily pulverized at 400°; fuses at 773°, (Daniell,) and sublimes unchanged at a white heat, in close vessels. It is scarcely affected by exposure to air and moisture; hence its general use in the arts for the manufacture of vessels of capacity, tubing, &c., that require lightness and durability. Heated to whiteness, (941° Daniell,) in contact with the air, it burns with great brilliancy, and is converted into oxide, (flowers of zinc.) It is very soluble in dilute sulphuric and muriatic acid, with the evolution of hydrogen gas. Zinc is used to form galvanic plates; in fireworks, and in medicine.

Tests. 1. The solutions of zinc are precipitated *white* by the pure alkalis and carbonate of ammonia, but are completely redissolved by excess of the precipitant.—2. The carbonates of potassa and soda give a permanent *white* precipitate of carbonate of zinc.—3. Hydrosulphuret of ammonia also gives a *white* precipitate, and so does sulphureted hydrogen when the solution is quite neutral.—4. Prussiate of potash gives a gelatinous white, or bluish white precipitate.

ZINC, ACETATE OF. *Syn.* Zinci Acetas. *Prep.*—1. Dissolve oxide of zinc in acetic acid, evaporate and crystallize.—2. Crystallized sulphate of zinc 143 parts; crystallized acetate of lead 190 do.; dissolve each separately in water, mix, filter, evaporate, and crystallize. Tonic, antispasmodic, and emetic. *Dose.* 1 to 2 grs.; as an *emetic* 10 to 20 grs.; externally, 2 or 3 grs. to water 1 oz., as an astringent lotion or injection.

ZINC, BROMIDE OF. *Syn.* Zinci Bromidum. Prepared like the corresponding salt of iron.

ZINC, CARBONATE OF. *Syn.* Zinci Carbonas. *Prep.* Add a solution of carbonate of soda to another of pure sulphate of zinc; wash and dry the precipitate. For the impure or native carbonate of zinc, (*calamina, carbonas zinci impura,* P. L.,) see Calamine.

ZINC, CHLORIDE OF. *Syn.* Muriate of Zinc. Butter of do. Zinci Chloridum. Do. Murias. *Prep.*—1. Evaporate the muriatic solution of zinc to dryness, and transmit dry muriatic acid gas over the residuum, heated in a tube. When pure, colorless, melts at 212°, deliquescent, volatilized at a red heat, soft, like butter.—2. (P. Cod.) Zinc ℥xx; muriatic acid q. s.; dissolve, add nitric acid ℥j, evaporate to dryness, dissolve in water, and add chalk ℥j; in 24 hours filter, and evaporate to dryness. *Dose.* 1 to 2 grs. in scrofula, epilepsy, &c.; and externally as a caustic, or as an astringent lotion, (2 grs. to water f℥j.)

ZINC, CYANIDE OF. *Syn.* Hydrocyanate of Zinc. Cyanuret of do. Zinci Cyanidum. Do. Cyanuretum. *Prep.* (M. Henry.) Add a solution of cyanide of potassium to another of pure sulphate of zinc; wash and dry the precipitate. *Dose.* ¼ to 1 gr. twice a day, in epilepsy, hysteria, and other nervous affections, heartburn, worms, &c., and as a substitute for prussic acid.

ZINC, FLUORIDE OF. A white compound, scarcely soluble in water, obtained by acting on oxide of zinc with liquid hydrofluoric acid.

ZINC, IODIDE OF. *Syn.* Hydriodate of Zinc. Zinci Iodidum. Do. Hydriodas. *Prep.* (Duflos.) Iodine 2 parts; granulated zinc 1 do.; water 4 do.; proceed as for iodide of iron, only employing a glass or porcelain vessel. Deliquescent. 15 grs. to water f℥vj; used as a collyrium in scrofulous inflammation of the eye, (Poulet;) ʒj to lard ℥j, as a powerful resolvent to scrofulous and other glandular swellings; rubbed on the part twice a day. (Ure.)

ZINC, OXIDE OF. *Syn.* Zinci Oxydum, (P. L. E. & D.) Zinci Calcinatum. Nihil Album. Lana Philosophica. Pompholyx. Flowers of Zinc. Calx of do. Flores Zinci. Calx do. *Prep.* (P. L.) Sulphate of zinc (pure) lb. j; sesquicarbonate of ammonia ℥viss; dissolve each separately in 6 quarts of water, filter, mix, well wash the precipitate with water, and calcine it for 2 hours in a strong fire. "White, tasteless, entirely soluble in diluted nitric acid without effervescence; and this solution is not affected by nitrate of baryta, but yields a white precipitate with ammonia, entirely soluble in excess of the precipitant." (P. L.) *Dose.* 5 to 10 grs., as an antispasmodic; in epilepsy, &c. Used also as a dusting powder, and to make an ointment. It has been proposed as a substitute for white lead in painting, than which it covers better, but dries slower; requires the addition of dried white vitriol. *** The last eight synonymes are usually applied to the oxide procured by heating the metal in contact with air, but its composition, properties, and uses are the same as those of the oxide, P. L. See Flowers of Zinc.

ZINC, SULPHATE OF. *Syn.* Zinci Sulphas. *Prep.* I. (P. L.) Granulated zinc ℥v; diluted sulphuric acid 1 quart; dissolve, filter, evaporate to a pellicle, and set it aside to crystallize.

II. The common sulphate of zinc of commerce frequently contains copper, cadmium, lead, iron, and manganese. By digesting its concentrated solution for some time with metallic zinc, it may be freed from copper, lead, and cadmium, for these metals are all reduced and precipitated in a metallic state; or the acid solution may be treated with sulphureted hydrogen as long as any precipitate forms. In order to separate the iron, chlorine gas is passed into the solution, by which the iron is converted into the protochloride; if this solution be exposed to the air for a length of time, it absorbs oxygen, and oxide of iron (basic salt?) is deposited as a yellow powder, from which the solution must be filtered. If the sulphate contain manganese, which is not very often the case, the solution must be boiled up a few times with purified charcoal, filtered and evaporated. (*Jour. für prakt. Chem.*)

Remarks. Pure sulphate of zinc must alone be used in medicine. The commercial sulphate (*white copperas, white vitriol, salt of vitriol, vitriolum album, sal vitrioli, zincum vitriolatum, &c.,*) is prepared by roasting native sulphuret of

inc (*blende*) in a reverberatory furnace, lixiviating he calcined mass, and evaporating till the liquid 'orms a white semicrystalline mass on cooling. The pure sulphate is "totally dissolved by water, and the white precipitate formed by ammonia is redissolved when the ammonia is added in excess." (P. L.) "When a solution in 6 waters is boiled with a little nitric acid, and a solution of ammonia is then added till the oxide of zinc at first precipitated is all redissolved, no yellow precipitate remains, or a trace only, and the solution is colorless." (P. E.) *Dose.* As an antispasmodic, tonic, or expectorant, 1 to 5 grs.; as an *emetic*, 10 to 20 grs.

ZINKING. Copper and brass vessels may be covered with a firmly adherent layer of pure zinc, by boiling them in contact with a solution of chloride of zinc; pure zinc turnings being at the same time present in considerable excess. The same object may be obtained by means of zinc, and a solution of sal ammoniac, or caustic potassa. (Boettger's Beiträge.)

ZIRCONIA. *Syn.* Oxide of Zirconium. A white pulverulent earth discovered in the jargon, or zircon, of Ceylon, by Klaproth, in 1789, and it has since been found in the jacinth. To obtain it the stone should be calcined and thrown into cold water, to render it friable, and then powdered in an agate mortar. Mix the powder with nine parts of pure potash, and project the mixture by spoonfuls into a red-hot crucible, taking care that each portion is fused before another is added. Keep the whole in fusion, with an increased heat, for an hour and a half. When cold, break the crucible, separate its contents, powder, and boil in water, to dissolve the alkali. Wash the insoluble part; dissolve in muriatic acid; heat the solution, that the silex may fall down; and precipitate the zirconia by caustic fixed alkali. Or the zirconia may be precipitated by carbonate of soda, and the carbonic acid expelled by heat. Zirconia has neither taste nor odor, is insoluble in water, and forms salts with the acids. It is distinguished from all the other earths, except thorina, by being precipitated when any of its neutral salts are boiled with a saturated solution of sulphate of potassa. It is distinguished from alumina and glucina by its salts being precipitated by all the pure alkalis, and by being insoluble when they are added in excess. The precipitated hydrate and carbonate are readily soluble in acids.

ZIRCONIUM. The metallic base of zirconia. It is obtained by heating in a glass tube with a spirit lamp, a mixture of potassium, and the double fluoride of zirconium and potassium, carefully dried. The product must be washed with water, and digested for some time in dilute muriatic acid. (Berzelius.) The resulting black powder is zirconium. It has been but very imperfectly examined.

ZOONIC ACID. A name given by Berthollet to the acid liquid procured by distillation from animal substances. It has been shown by Thénard to be merely acetic acid.

ZOOTIC ACID. (See Prussic Acid.)

ZUMIC ACID. (From ζυμη, *leaven.*) The acid formed in bread, and in some other vegetable substances, which have undergone the acetous fermentation.

THE END.

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